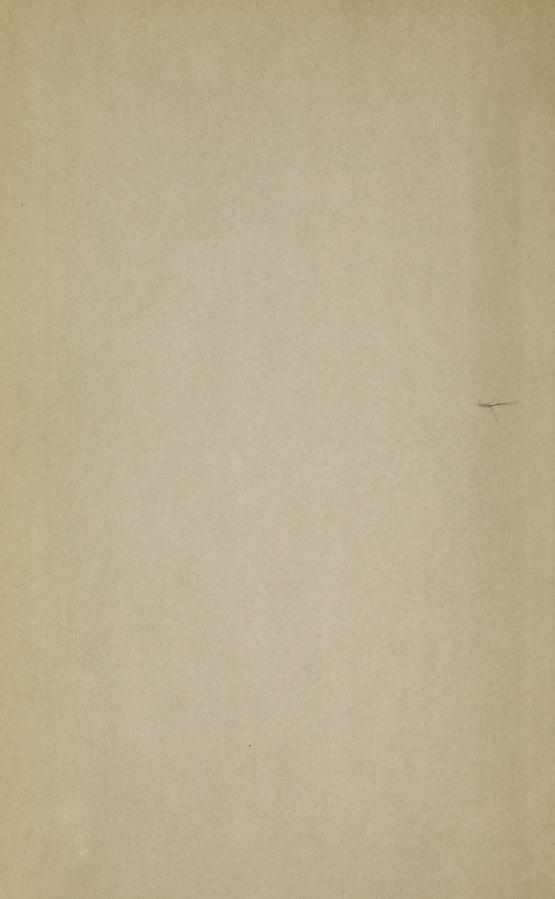
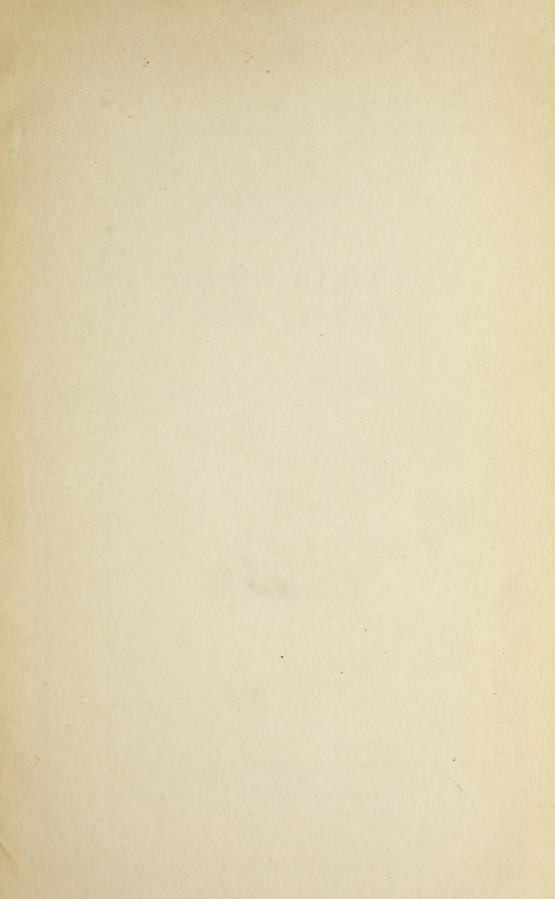


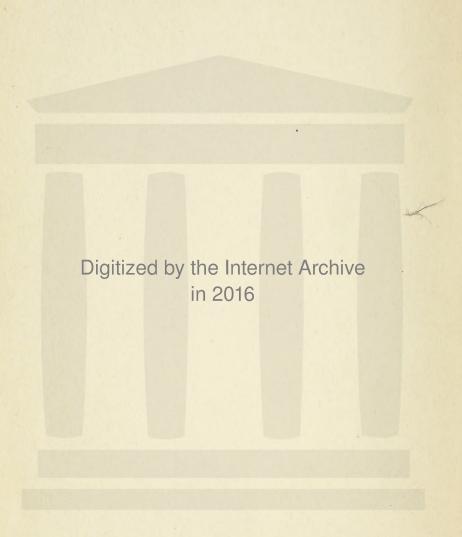
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NORTH CAROLINA GEOLOGICAL AND ECONOMIC SURVEY

JOSEPH HYDE PRATT, Director and State Geologist

BULLETIN No. 33

The Deep River Coal Field of North Carolina

BY

MARIUS R. CAMPBELL and KENT W. KIMBALL

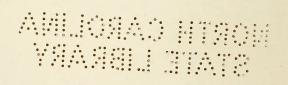


Prepared by
United States Geological Survey
In Cooperation with the
North Carolina Geological and Economic Survey

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LETTER OF TRANSMITTAL

CHAPEL HILL, N. C., June 1, 1923.

To His Excellency, CAMERON MORRISON,

Governor of North Carolina.

Sir:—There has just been completed a report on "The Deep River Coal Field of North Carolina," which has been prepared by the State Survey in coöperation with the United States Geological Survey. The investigation of this coal field has aroused a great deal of interest throughout the State in regard to the occurrence of a commercial quantity of coal in North Carolina. There is a very large demand for information regarding this occurrence, and I would submit the report for publication as Bulletin No. 33 of the series of publications of the North Carolina Geological and Economic Survey.

Yours respectfully,

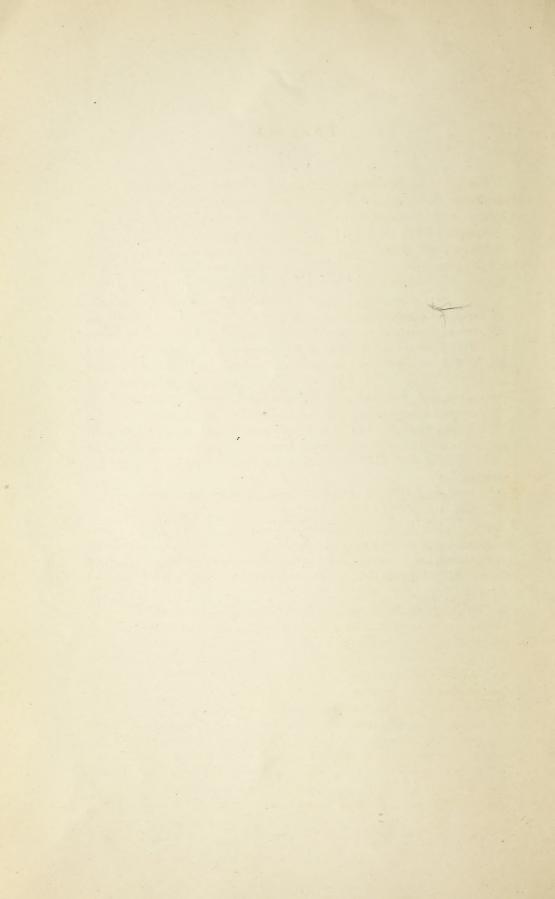
Joseph Hyde Pratt, Director, North Carolina Geological and Economic Survey.

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For about one hundred and fifty years coal has been known to occur in North Carolina, and for many years there has been more or less interest aroused amongst our people as to the possibility of developing commercial fields of coal. Considerable prospecting and some mining has been done during this period, but most of the work was a failure due to several causes, chief of which perhaps was lack of capital and having men unfamiliar with coal mining in charge of operations. As a result the public began to consider that either the coal was so poor or the mining conditions so bad that it was doubtful if coal mining could ever be made to pay. This was probably a natural sequence considering what was known of the occurrence of some of the coal which was in very thin seams and obviously could not be worked Also considerable of the coal that was first used was weathered and did not have the heating properties expected of it. The present investigation was undertaken with the idea that the coal of the Deep River Field is much more valuable than has been generally believed and that it should become a source of fuel, not only for mills and railroads of Eastern North Carolina, but for a domestic use in the form of coke.

There are two areas in the State in which coal occurs: one known as the Deep River Coal Field covering portions of Chatham, Lee and Moore counties, and which is described in detail in this report; and the other, the Dan River Coal Field covering portions of Stokes and Rockingham counties. The coal beds of both these fields occur in sandstones and shales of Triassic age, which outcrop in comparatively narrow belts.

The Dan River Field has been described in detail by Mr. R. W. Stone, Geologist of the United States Geological Survey, in Economic Paper 34, 1914, pages 115-149, of the State Survey's publications; and the conclusion reached in regard to this coal field was that "after a thorough and careful examination of the Triassic beds in the Dan River Field the conclusion is reached that there is no reason to expect to find commercially valuable coal beds in this district." This report substantiated the information that the Survey had regarding this field, and since this report came out there has been no further prospecting or consideration given to this field from a commercial standpoint.

The Deep River Coal Field has been investigated from time to time over a period of nearly one hundred years, but only one of these investigations was more than a superficial examination. This was the

report of Dr. H. M. Chance, made in 1884-85 for the North Carolina Department of Agriculture. Dr. Chance's conclusions, which were not particularly favorable and which are discussed in this report, were that in the area described "the prospects are sufficiently encouraging to warrant a thorough exploration of each individual tract by the landowners; that in the area between Farmville and Gulf two beds of coal exist that may be considered workable."

In discussing the subject the authors give a very interesting history of the discovery and development of coal in this field. It seems evident that the coal was discovered at Gulf some time prior to 1775, and from that time to the present there has been considerable uncertainty as to the quantity and quality of the coal in the area.

The geography of the field shows it to extend from a short distance northeast of Cape Fear River in a southwesterly direction to Carthage and in the other direction from Sanford on the southwest to a few miles beyond Gulf on the northwest, embracing portions of Chatham, Lee and Moore counties. It is known and designated as the Deep River Coal Field because almost all the prospecting and developing has been on or near that stream from near Glendon to the point where Deep and Haw rivers unite to form the Cape Fear. The area in which the presence of coal has been demonstrated is only a small part of the area outlined above.

The geologic formations and structure cover a considerable portion of the report and are discussed in great detail. The coal beds are associated with sandstones and shales which are of Triassic age and belong to the Newark group. This Newark group of rocks includes the red sandstones of the Connecticut Valley in Connecticut and Massachusetts, and the red sandstone and shale of Virginia. Newark group in the Deep River Field consists of three generally recognized parts: a lower formation to which the name Pekin has been given, composed largely of red and brown sandstone; a middle formation of light colored or drab shale, sandstone and coal beds, to which has been given the name Cumnock; and an upper formation called the Sanford, consisting mainly of red conglomerate of great though unknown thickness. This portion of the report also describes the character and location of the dikes cutting through the formations, and faults that were noted; and shows cross-sections of the formation at various places throughout the area. A geologic map of the area also accompanies the report.

In describing the coal, attention is called to the occurrence of two oenches known as the upper and lower. Formerly in speaking of the thickness of the coal beds both benches were included in the width

given as seven feet six inches, and it is believed that this entire thickness was originally mined. It is only the upper bench, where the coal varies in thickness from three feet to nearly four feet, that is considered at the present time as commercial coal, although it is believed that under certain conditions this lower bench might be mined and cleaned profitably. The extent of the workable coal and available tonnage is estimated by the geologists as approximately sixty-eight million tons of recoverable coal in the district west of the Deep River fault; and that mining can be carried on profitably to a depth of two thousand feet. The area in which this tonnage is included is about twenty-five square miles, and it is considered reasonable to assume that the coal bed throughout this area averages at least three feet in thickness of recoverable coal. The character and quality of the coal have been very carefully studied and physical and chemical analyses are given of coal taken from various sections of the area. One interesting feature of the chemical composition of the coal is that it contains approximately two per cent of nitrogen, which could be obtained in the form of ammonium sulphate as a by-product in coking the coal, which would give approximately twenty-three pounds per ton of coal. The coking test showed that the coal would make a coke of very good quality in so far as could be determined by a laboratory test and is fairly equal to either Freeport or Pittsburgh cokes. It is believed that one use of the Deep River coal that should be given careful consideration is to coke it, using the coke obtained as a domestic fuel, and the yield of gas for generating electric power for transmission.

The ammonium sulphate, obtained as a by-product, will be of large value for agricultural purposes. There would also be obtained as another by-product approximately twenty-two gallons of tar (dehydrated) per ton of coal. The by-product yield in coking this coal compares very favorably with yields from Freeport coal.

The report also discusses briefly the possibilities of oil in the area, and the conclusions of the geologists are that from a geological point of view all the evidence collected in the field bearing on this question is of a negative character.

The present report has been prepared through the coöperation of the United States Geological Survey and the North Carolina Geological and Economic Survey. Geologists were detailed from the Federal Survey staff to make the investigation. The United States Bureau of Mines also coöperated in the investigation by sampling the coal and making chemical and physical analyses and washing and coking tests of same.

The Director of the Survey, who made several trips into the field during the investigation, wishes to extend the thanks of the Survey and of the geologists making the investigation to the citizens of the community for their kindness and courtesy in assisting in securing data on the mineral resources of the area. Others who were particularly interested in the coal itself were most liberal in giving their services and means at all times, and the Survey desires at this time to express its special thanks to Mr. Charles Reeves of Sanford, Mr. William Hill of Cumnock, Mr. Bion Butler of Southern Pines, Mr. J. S. Cox of the Norfolk Southern Railway, General E. F. Glenn of Glendon, Dr. M. E. Street of Carthage, and Mr. McIver, for these services.

While the history of coal mining operations in this Deep River Field has been one of many failures due to lack of adequate capital to develop a mine under the prevailing mining conditions, to lack of experience in coal mining of those in charge of the work, and to lack of adequate transportation facilities, today, on account of changed conditions of marketing and transportation facilities and the thousands of homes calling for domestic fuel supply, there seems to be no reason why the mining operations should not be reasonably successful. This of course is predestined on there being an adequate supply of coal that can be obtained at moderate cost, the probability of which is discussed in this report.

Joseph Styde Pratt.

Director,

North Carolina Geological and Economic Survey.

THE DEEP RIVER COAL FIELD OF NORTH CAROLINA

BY

MARIUS R. CAMPBELL and KENT K. KIMBALL

INTRODUCTION

GENERAL STATEMENT

The Deep River coal field of North Carolina (see Key map on Pl. 1 in pocket), although it has been known for about 150 years, has had an unfortunate history of failure after failure in attempts to mine and market the coal, until the general public has either forgotten that such a coal field exists, or is strongly imbued with the idea that the coal is so poor and the mining conditions are so bad, that it is doubtful if it ever could be made to pay. The present report contains the results of a recent examination by geologists of the United States Geological Survey coöperating with the North Carolina Geological and Economic Survey, which shows that the coal is of excellent quality; that the mining conditions are fairly good for a rather steeply dipping coal bed; and that the general conditions in the surrounding region are favorable for the development, on a larger scale than has ever been attempted, of that part of the margin of the trough extending from Cumnock (Pl. 1, in pocket) southwestward at least to Carbonton, and possibly from Cumnock for a few miles southeastward toward Colon.

The coal beds of the Deep River Field occur in sandstone and shale of Triassic age, which crop out in a comparatively narrow belt from Oxford near the northern border of the State to the South Carolina line, twelve or fifteen miles west of Pee Dee River. Coal has been reported at many places in this belt, but the only known coal of commercial importance is found on Deep River, west and northwest of Sanford.

It was found necessary, before attempting a study of geologic conditions in the Deep River Field, to make a base map upon which the geologic data could be plotted, as no map of this region, worthy of the name, could be found. The map, shown in Plate 1, is the result of a survey carried on by the junior author assisted by William J. Cox and Lynn J. Adcock, and much of the success of the report is due to the indefatigable work of these men in covering the ground in the appointed time. The survey was made with plane-table and telescopic alidade and distances were determined by stadia measurements. When the major part of the map had been completed it was found that the

dikes, which are present in great numbers, are magnetic and have a decided influence on the magnetic needle of the plane-table. As courses were determined by this needle, any local attraction produced by a dike would tend to cause an error in the direction of the line being surveyed. Owing to this source of local attraction many errors will be found in the directions of the roads, and the geographic relations of features shown on the map may be quite different in detail from the relations of the same features on the ground; but, as the local variation due to one dike may be in an opposite direction from that due to another dike, the effect of one tends to neutralize the effect of the other and for that reason the map, taken as a whole, is approximately correct. The public is, however, cautioned against depending, in important matters, solely upon this map for distances and directions of surveyed lines and acreage inclosed by such lines.

In carrying on both the topographic and the geologic work in this field, the writers found the citizens, as a rule, willing and anxious to help in securing data on the mineral resources of the country; and as it is impossible to enumerate individuals who furnished information of this sort, the writers wish to extend their thanks to all for their kindness and courtesy. Those who are most deeply interested in the coal itself contributed in many ways to the success of the work; chief among those who gave their services and means at all times are Mr. Charles Reeves, who assisted very materially by furnishing information regarding coal prospects, maps, and the result of drilling operations of the Carolina Coal Company; Mr. William Hill, then General Manager of the Cumnock Coal Company, who assisted the writers in gathering information concerning the Cumnock mine, the prospecting work that had been done by the Cumnock Coal Company and the logs of deep wells which the company had drilled on its property; Mr. Bion Butler of Southern Pines, who furnished geologic data which has been of great value in solving some of the difficult problems encountered in the field, and without which the writers would have found it impossible to have completed their work in the time alloted for that purpose; and Mr. J. S. Cox, local superintendent of the Norfolk Southern Railroad for a motor car trip over this line from Hemp to Raleigh. General E. F. Glenn, Doctor M. E. Street and Mr. McIver were also helpful in furnishing information regarding general conditions and in assisting the writers in getting about the field.

HISTORY OF DISCOVERY AND DEVELOPMENT

The history of the discovery and development of coal in this field has never been recorded in print, and consequently much of it has been lost, or if preserved, it exists only in tradition.

The first published account of coal that the writers have discovered is contained in a letter written by Professor Olmsted¹ from Chapel Hill in 1820. In this letter he says:

An extensive secondary formation has lately been discovered near us. On the road between this place and Raleigh, traveling eastward, we come to it four miles from the college; but at another point it has been discovered within two miles of us. It is a sandstone formation . . .

It was natural to look for coal here and I have for some time directed the attention of my pupils, and of stonecutters to this object. Two or three days since one of the latter brought me a handful of coal, found in this range, on Deep River, in Chatham County, about 20 miles south of this place. The coal is highly bituminous, and burns with a very clear and bright flame. It is reported that a sufficient quantity has already been found to afford an ample supply for the blacksmiths in the neighborhood.

From the quotation just given, it would seem that the Deep River coal was discovered only a few years before 1820. It is, however, probable that it had been known locally for many years, but had not been brought to the attention of the State Geologist. This view of the case is substantiated by Professor Olmsted's 2 statement in his report of 1824, which is as follows:

In addition to the foregoing presumptions that coal might be found in the district of country under consideration, we have it in our power to say that coal has actually been discovered in this region, and that a bed of considerable extent has been opened not far from the Gulf3 on Deep River.

It is about 50 years since this coal bed was first discovered. Wilcox, an enterprising gentleman, proprietor of the Old Iron Works at the Gulf, took some pains to have it opened, and to introduce the coal into use.

Professor Emmons⁴ corroborates this statement in his report of 1852 in which he says: "It [the Horton mine at Gulf] was known in the Revolution, and a report made to Congress, respecting it, is still extant." The writers have searched for this report, but have not been able to find it.

It also is probable that the outcrop of the coal beds from Farmville to Carbonton was known and prospected in the early part of the nineteenth century. Chance⁵ says:

Coal was dug from open pits for blacksmithing in the Deep River coal field early in this, if not indeed in the last century, but no systematic attempt was

¹Olmsted, Prof. D., Red sandstone formation of North Carolina, Am. Jour. Sci., vol. 2, page 175, 1820.

²See manuscript, page 5.

³The name Gulf was given to the settlement at the sharp bend of Deep River, by boat-

rine name Guil was given to the settlement at the sharp bend of Deep River, by boatmen who found here an unusually deep portion of the river between shallows formed by the dikes where they cross the stream.

4Emmons, Ebenezer, Report of Professor Emmons in his Geological Survey of North Carolina, p. 131, Raleigh, 1852.

5Chance, H. M., Report on North Carolina coal fields to the Department of Agriculture, p. 23, Raleigh, 1885.

made to open the field to market until the slackwater improvement of the Deep River. As these improvements were seriously damaged by floods soon after the completion, the people were discouraged from further attempts at that time. The next attempts were made upon the completion of the railroad from Fayetteville to Egypt and the Gulf. Some coal was shipped over this road from the shaft at Egypt, but the cost of transportation to Fayetteville and trans-shipment and towing down the Cape Fear River to Wilmington. . . on a river full of shoals, was doubtless too great to leave any profit. Operations were most actively pushed in the period immediately preceding the [Civil] war. During the war coal was mined at Farmville, Egypt, Gulf, and the Evans' place, and shipped by river to Fayetteville and to Wilmington, where it was used to some extent by blockade runners, but the aggregate amount thus shipped must have been quite small.

From the quotations given above and from information gathered in the field it seems evident to the writers that the coal of this field was discovered at the Gulf some time previous to 1775 and that the Horton coal mine was in operation at that place at least some of the time during the Revolution, but without doubt the mine was operated in a small way to supply local needs.

It is also probable that within the next 50 years after the Horton mine was opened the outcrop of the coal bed had been prospected and was fairly well known from Farmville (now the Carolina coal mine) at least as far as Gulf. Peter Evans, who owned the plantation in the great northward bend of Deep River, including the village now known as Cumnock, began mining coal, it is reported, on his property, then called Egypt¹ in 1830.

In 1851 the Egypt plantation was sold to L. J. Houghton and Brooks Harris. Harris soon acquired the interest of Houghton, and in 1852 sank the Egypt shaft, probably the most important single piece of development work ever undertaken in this coal field. The shaft pierced the principal or Cumnock coal bed at a depth of 430 feet, but was continued to a total depth of 460 feet. The property changed hands frequently, and in 1854 passed into the ownership of the Governors Creek Steam Transportation and Mining Company, which operated the mine until after the Civil War when, by order of the Convention, the name was changed to "The Egypt Company."

The market for this coal was then largely to the east and the great problem was to get it to seacoast cities at a cost that would enable it to be sold at a profit, in competition with coals from other fields. Two lines of outlet for the coal were considered: (1) an all-water

¹The original name of the settlement on this plantation was LaGrange, but this name was changed by Peter Evans to Egypt, as the result of a facetious remark by one of his neighbors. One day, as the story goes, Evans met Peter Smith, a Scotchman, on the road and asked him where he was going. Smith replied that he was going to the "land of Egypt" to get corn. Evans was so pleased with having his plantation called "The land of Egypt" that he ordered a gift of corn to Peter Smith, and soon thereafter had the name of his plantation and the little settlement changed from LaGrange to Egypt.

route by the establishment of slack-water navigation on Deep and Cape Fear rivers, and (2) by railroad to Fayetteville and then by barges down Cape Fear River from that place to Wilmington. The railroad was the first to be secured, construction beginning at Fayetteville in 1855. Egypt was, during the Civil War, the western terminus of this road and considerable coal mined at Farmville, Egypt and Gulf was shipped to Fayetteville to supply the arsenal at that place or to be transshipped to Wilmington for the use of blockade runners.

The building of locks and dams to secure slack-water navigation between Fayetteville and Carbonton was begun by private parties about the same time as railroad construction was begun, but it resulted in failure and the State took over the project. Just as the locks and dams were completed war broke out and they were forgotten in the stress of wartime conditions, and all of the dams went out, except the Lockville, Gorgas and Gulf dams, which were kept up to supply water-power for grist mills. Upon the termination of the war, attention was again attracted to the need of slack-water navigation on Deep River and the Deep River Navigation Company was organized and began rebuilding the locks and dams, largely for the purpose of transporting iron ore from the vicinity of Buckhorn on Cape Fear River to the Endor furnace on Deep River. This company maintained locks and dams on Cape Fear River at Battles and Buckhorn and on Deep River at Lockville, Gorgas, Endor and Gulf. A dam was also built at Carbonton, but the lock was never used. It is reported that slack-water navigation was carried on in 1873 and for several years thereafter, but eventually the locks and dams were permitted to fall into decay as the iron business declined and finally all were swept out of existence, and slack-water navigation on Deep River was a thing of the past.

The Egypt mine (Pl. III) had a checkered history after the Civil War; ownership changed frequently, but no one seemed to be able to operate at a profit. Finally in 1870 the mine was closed down and it remained flooded until 1888 when it was reopened, but with no better success in mining and marketing the coal than had been attained before. The mine continued in operation until 1902, but owing to several bad explosions of gas and to financial difficulties it was again closed and remained under water until 1915. At the last mentioned date the property passed into the hands of the Norfolk Southern Railroad Company and was rehabilitated under the name of the Cumnock Coal Company, the name Egypt being no longer acceptable on account of the many disastrous explosions that had occurred in the mine when it was operated under that name. From 1915 down to 1922

the entire output of Cumnock mine has been used for railroad purposes, but this has not been great, as the mine has been operated in only a small way. In September, 1922, the property was bought by the Erskine Ramsey Coal Company with the intention of greatly enlarging the mine and increasing its output.

About 1921 the Carolina Coal Company was organized for the purpose of developing a mine at the site of the old village of Farmville in Chatham County, just across the river from the Cumnock mine. The company began the shipment of coal in a small way in the summer of 1922 by trucking the coal to the railroad at Cumnock, but recently grading has been done for a direct connection with the Norfolk Southern Railroad and it is probable that by the time this report goes to press the rails will have been laid and all-rail shipments begun.

The entire history of coal mining operations in the Deep River Field has been one of many failures, due to lack of adequate capital to develop a mine under the mining conditions here prevailing, to lack of experience in coal mining, and to lack of adequate transportation facilities to reach the consumers who were located mostly on the seashore many miles distant. Today conditions of marketing and transportation are very different; the railroads, the cotton mills, and other manufacturing plants are ready and eager for fuel, to say nothing of the thousands of homes that call for a domestic supply, and as the field has now fairly adequate railroad service, there seems to be no reason why mining operations should not be reasonably successful provided there is an adequate supply of coal in the ground that can be obtained at moderate cost.

THE PRESENT INVESTIGATION

The present investigation was undertaken with the idea that the coal of the Deep River Field is much more valuable than has been generally believed and that it is a source of fuel for the mills and railroads of Eastern North Carolina if it could be demonstrated that there is large enough tonnage available at a reasonable depth to warrant the investment of capital.

It was fully realized, before systematic work was undertaken, that exposures of coal and the associated rocks are poor and totally inadequate for a minute survey of the field. It was also realized that most of the coal prospects had been opened many years ago and that almost without exception they are now caved so that the coal is as effectually concealed as if mines and prospect pits had never been opened.

To the writers it seemed possible, however, to map the field and determine in a general way whether the coal is lenticular or whether

it extends indefinitely along the belt of Triassic rocks as well as across the trough toward the southeast. It also seemed possible, by careful field observation and the plotting of dips to determine with some degree of accuracy the shape of the trough and also the depth of the coal at different points within the trough. The results of the examination herewith presented are far from satisfactory to the writers, but they are about as accurate as it is possible to make them without deep drilling in the interior of the trough.

GEOGRAPHY OF THE DEEP RIVER COAL FIELD

The Deep River coal field, as outlined on the accompanying map, extends from a short distance northeast of Cape Fear River in a southwesterly direction to Carthage and in the other direction from Sanford on the southeast to a few miles beyond Gulf on the northwest. It embraces parts of Chatham, Lee and Moore counties. It has long been known as the Deep River Coal Field because almost all the prospecting and development has been on or near that stream from near Glendon to the point where Deep and Haw rivers unite to form Cape Fear River, but it should be clearly understood that the presence of coal has been demonstrated in only a small part of the area outlined above.

The field here considered lies mainly in the valley of Deep River and the surface consists of a number of low plateaus or terraces that, near the river and also along its more important tributaries, have been sharply dissected. The altitude ranges from about 165 feet above sea level at Avants Ferry on Cape Fear River to 580 feet on the ridge at Carthage. The latter is the highest land in the field and is a narrow remnant of a plateau that was doubtless once continuous throughout this part of the State, but now has been so dissected by streams that only remnants of its once even surface remain on the inter-stream areas. On the southeastern margin of the field the coal-bearing rocks have been in places deeply covered with white sand which prevents, in large measure, dissection by the streams and consequently this part of the field consists generally, except in the immediate vicinity of the larger streams, of an undissected plain in which the bed rock is effectually concealed by the veneer of white sand.

The area represented by the map is essentially an agricultural country, the principal crops being cotton and tobacco. Recently the raising of fruits of various descriptions has become quite successful in adjacent areas and it seems probable that their cultivation may extend into this district. The river bottoms are particularly fertile, being almost universally cleared and in a high state of cultivation, except

a deep fringe of trees, vines, and weeds which line the immediate banks of the rivers, as shown in Pl. 2-A.

The highways generally follow the inter-stream divides, for these, except near the rivers, are generally flat and well suited for highway construction. In building some of the new automobile roads, however, less attention is paid to the surface features and the roads pursue more direct courses than would be possible were they to follow the divide between streams. The railroads, on the contrary, generally follow the minor drainage lines in their courses across the major drainage basins of the region, for in so doing they secure nearly a water grade.

The principal railroad in the field is the main line of the Seaboard Air Line which enters the field from the north near Moncure, passes south through Sanford and leaves the field 11/2 miles west of Jonesboro. The Atlantic and Yadkin (a branch of the Southern Railway) extends southeastward from Greensboro to Sanford where it terminates, but through passenger trains are run on to Wilmington over a branch of the Atlantic Coast Line. The Norfolk Southern Railroad has recently acquired or built a line running southwestward from Raleigh to Charlotte. This railroad enters the Deep River Field at Corinth, east of Cape Fear River, traverses the developed coal district about Cumnock and Gulf and leaves the mapped area at Putnam. Two small narrow-gauge lines also serve the field: the Atlantic and Western from Sanford to Broadway and Lillington; and the Randolph and Cumberland through Hallison, Carthage, and Cameron. Formerly a narrow-gauge branch of the Norfolk Southern extended from Carthage to Pinehurst, but train service had been abandoned for some time when the present field examination was made.

The Deep River Coal Field lies near the center of the State, being about 45 miles southwest of Raleigh, 60 miles southeast of Greensboro, 125 miles east of Charlotte, 35 miles northwest of Fayetteville, and 30 miles north of Southern Pines and Pinehurst. Sanford, the principal town, is situated on the main artery of automobile travel from Washington and Richmond to the winter resorts of the South and it also has good automobile roads leading to the more important cities and towns in the surrounding region.

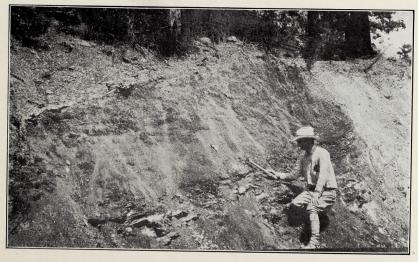
GEOLOGIC FORMATIONS

GENERAL STATEMENT

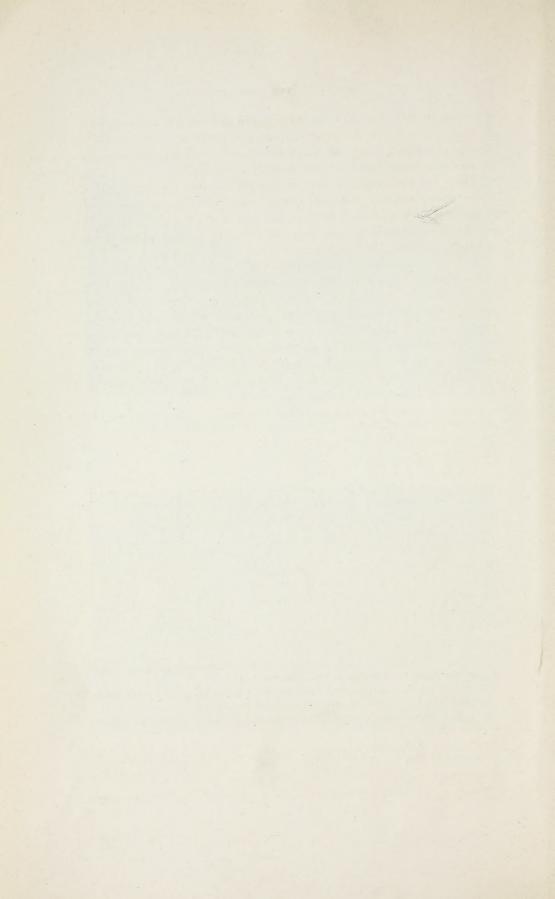
The sandstone and shale which are associated with the coal beds in the Deep River Field extend in a narrow belt of outcrop nearly across the State in a north-south direction. This belt begins in a point in



A. Deep River from the Horseshoe Bridge. The bottom on the left is cleared and farmed, except for a fringe of trees and vines on the river bank.



B. Outcrop of the Cumnock coal bed near Gulf. This outcrop, in a recent cut made by the Norfolk Southern Railroad, shows about 4 feet of badly watered coal.



the vicinity of Oxford in Granville County and extends southwestward through the towns of Durham, Sanford, and Carthage, about as shown on Kerr's¹ geologic map of the State to beyond Wadesboro, where it crosses into South Carolina near its southern terminus.

There has been much written on the subject of the geologic age of these rocks, which, according to the fossil remains found in them, appears to have been well determined. The writers, during the course of the present investigation, gave no attention to this phase of the subject, accepting the usage current in geologic literature.

The red sandstone of the Connecticut Valley in Connecticut and Massachusetts; the great belt of red sandstone, shale and trap rock extending from the Hudson River to Culpepper, Virginia; the Richmond, Farmville, and other scattered areas of similar rocks in Virginia; and the rocks of the Dan and Deep River fields of North Carolina all are of Triassic age and belong to what geologists call the Newark group, a name given to them by W. C. Redfield, because of their excellent development in the vicinity of Newark, N. J. Redfield introduced the name as follows:²

I propose the latter designation [Newark group] as a convenient name for these rocks [red sand stones and shales of New Jersey and Eastern Pennsylvania], and those of the Connecticut Valley, with which they are thoroughly identified by foot prints and other fossils, and I would include also the contemporary sandstones of Virginia and North Carolina.

Later I. C. Russell³ definitely applied the term Newark group to the rocks of both the Dan and the Deep River fields of North Carolina with the idea that possibly future workers might subdivide the group into a number of formations.

In the Deep River Field geologists have recognized certain differences in the rocks, some of the rocks being distinctly red and others being generally drab or gray, but no one, with the exception of Ebenezer Emmons, one of the former State geologists, has definitely attempted to map such distinctions and to give them specific names. Emmons, in his report of 1852 (p. 120), refers to the various divisions of the Newark group as follows:

The coal seams of Deep River may be described under three grand divisions, proceeding from the inferior to the superior beds:

- 1. Inferior conglomerates and sandstones below the green and black slates.
- 2. Black slates, with their subordinate beds and seams.
- 3. Sandstones, soft and hard, with freestone, grindstone grits, and superior conglomerates.

¹Kerr, W. C.: Report of the Geological Survey of North Carolina, vol. 1, Raleigh, 1875.

²The name Newark as applied to a geological formation was proposed by W. C. Redfield in a paper, "On the relations of the fossil fishes of the sanctone of Connecticut and other Atlantic States to the Triassic and Colitic periods." Am. Jour. Sci., 2d series, vol. 22, pp. 357, 1856, and Prac. Am. Asso. Adv. Sci., vol. 10, pp. 181, 1856.

²Russell, I. C.: Correlation papers—the Newark system. U. S. Geological Survey, bulletin 85, 1892.

In his report of 1856 (p. 228), Emmons recognizes in his text the three divisions enumerated in his earlier paper, for he says:

A natural division seems to exist when we take into account the physical characters of the formation only; and indeed it would be disregarding important features, were these to be passed by unnoticed. According then to these features, the series should be divided into three great deposits, the lower red sandstone and its conglomerate; the coal measures including slates, shales and drab-colored sandstones, with their subordinates; and lastly, the upper red sandstones and marls.

But on the map accompanying this report he represents four divisions in the Newark group, as follows:

- (4) Upper sandstone.
- (3) Salines.1
- (2) Coal slate and coal.
- (1) Lower sandstone.

Although Emmons shows the four divisions on his sketch map in the report for 1856, it is doubtful if he could, in the field, generally distinguish the "Coal slate and coal" from the "Salines," the latter being simply drab shale, above the coal in the Cumnock shaft, which, because of the salt that it contains, can there be readily separated from the underlying coal-bearing rocks. The writers made no attempt to differentiate the "Salines" from the "Coal slate and coal," for it seems extremely doubtful if, in the weathered exposures generally found in the field, the two phases could be identified and differentiated.

The Newark group in the Deep River Field consists of three generally recognizable parts, by geologists called formations; a lower formation composed largely of red and brown sandstone, a middle formation of light-colored or drab shale, sandstone and coal beds; and an upper formation of mainly red conglomerate of great, though unknown thickness. In places these formations are clearly marked and easily followed on the surface, but in other places the middle formation disappears, being either faulted out or replaced by red sandstone or conglomerate similar to that in the other formations. As it is desirable to map and describe these formations, it seems best to give them specific names so as to simplify the descriptions and the reference to the formations as much as possible. In accordance with this idea, the name Pekin is selected for the lowest formation, Cumnock for the middle formation, and Sanford for the upper formation. The reasons for the selection of these names will be given under the description of each of the formations. In the following description the formations will be con-

^{&#}x27;Through an obvious error in preparing the geologic map for this report the "Salines" was placed below the "Coal slate and coal."

sidered in ascending order, beginning with the lowermost one which was laid down probably on a land surface of the ancient crystalline schist and slate.

PEKIN FORMATION

No specific name has heretofore been applied to the lowermost formation of the Newark group in this field; it has generally been referred to as the "Lower red sandstone." As it is one of the most definite formations of the group, it seems best to propose a geographical name for it. Unfortunately the names of the towns situated on the outcrop of this formation in the Deep River Coal Field are either in current use for other formations in nearby states, or the formation at the particular place does not show in typical form, hence no name within this field is suitable.

At the close of geologic work in the area here considered, the writers made a hurried examination of the Newark formations in Montgomery and Randolph counties. In this reconnaissance the succession of rocks in the group was found to be identical with that observed in the Deep River Field. The lowermost formation is prevailingly red and occupies a belt of outcrop about 2 miles in width on the northwest side of the trough of Newark rocks; this is succeeded by the overlying light and black shales of the Cumnock formation. The best exposure of the lowermost formation was seen on the road running due east from Mt. Gilead. This road crosses Little River 4 miles to the east and on the second terrace about one-half mile east of the river the red sandstone of the Newark appears. The road continues on this rock for a distance of 2 or 2½ miles and then passes onto the characteristic light-colored rocks of the Cumnock formation. In the midst of the lower red rocks is the village of Pekin, and it is proposed to call the lowermost red sandstone and shale Pekin for this place, as the formation here is in typical form.

In the Deep River Coal Field the Pekin formation shows in outcrop in a belt of fairly even width but more or less broken because of inability of the writers to recognize in places the overlying Cumnock formation, from the Carthage-Charlotte road on the southwest to Cumnock, and in a much narrower belt 8 miles or so northeast to Moncure on Deep River. Professor Emmons appears to have been the first person to assign a thickness to the lower sandstone. His original statement (Report of 1852, p. 137) is as follows:

The inferior mass or that below the slate, is about fifteen hundred [feet]

In his later and more comprehensive report (Report of 1856, p. 231), Emmons revises his figures to some extent, as follows:

The thickness of the lower red sandstones at the Gulf and Egypt [Cumnock] is at least fifteen hundred feet, and probably nearer two thousand.

Other writers on this field generally give the thickness of these sandstones as 1,500 or 1,600 feet, apparently accepting the estimate of Emmons as given above.

During the course of the present examination almost all roads crossing the Pekin formation were carefully surveyed by plane-table and telescopic alidade, distances being measured by stadia. As the survey progressed most of the outcropping rocks were noted and dips and strikes recorded in their proper positions on the plane-table sheet. Cross-sections of the Pekin formation made up from these data give fairly accordant results, as far as the best sections are concerned, of about 2,000 feet. This thickness was obtained on the new Carthage-Charlotte highway near Calvary Church, on the road running northwestward from Carbonton, and on the road running north from the bridge over Deep River at Cumnock.

In that part of the field north and east of Colon, the upper limit of the Pekin formation was not definitely determined, as the light-colored shale and sandstone which carry coal beds appear to be poorly developed and it was impossible to trace them continuously and determine the contact between them and the Pekin formations, but in a general way as far as Deep River the Pekin formation appears to be much thinner than it is farther south. A rough measure north of Zion Church shows a thickness of about 1,000 feet and a similar thickness seems to be present at Lockville at the crossing of Deep River.

East of Deep River the contact of the Pekin formation and the ancient schist makes a turn toward the northwest nearly at right angles to its previous course, and north of Moncure these beds appear to regain their normal thickness of about 2,000 feet. The reason for this abrupt change in direction of the line of contact was not apparent in the field, but it may be due to great irregularities in the surface on which the Pekin formation was deposited. Emmons in his report of 1856 (pp. 231-232) noted the extreme thinness of the Pekin formation at Jones' Falls (Lockville). He reports less than 40 feet, but he offers no adequate explanation of the anomalous conditions which reduced it to this thickness. He interprets the great mass of conglomerate which the writers saw on the railroad north of Moncure as an overlap of the upper red sandstone across the eroded edge of the light-colored shale, but this can hardly be the case as the belt of outcrop of the light-colored beds

is continuous and the rocks are well exposed on the Capital Highway in the north edge of the village.

The most remarkable member of the Pekin formation is a gray conglomerate composed of white quartz pebbles ranging up to 2 inches in diameter. This bed is hard and very resistant and has been extensively quarried in the past for millstones. It is the basal conglomerate of the Pekin formation and was laid down on the eroded edges of the ancient schist and slate which form the basement complex of the region. The pebbles were doubtless derived from quartz veins that are of common occurrence in the underlying rocks. They are well rounded and show by their shape that they have been rolled for a considerable distance by a fairly rapid stream of water. The matrix also consists of the same material reduced to a still finer condition.

The millstone conglomerate is found in its best development on the northwest border of the field from the Carthage-Charlotte highway northeastward to the vicinity of Putnam. It was also noted by the writers on the east side of Deep River southeast of the Carolina coal mine, and fragments were found on the west side of the river north of the coal mine. This rock was in great demand in the early days for the manufacture of millstones, and quarries were opened at many places on its outcrop. The largest operation of this kind, the ruins of which were seen by the writers, was on McCallum Fork of Richland Creek, about 300 feet below the crossing of the highway that connects Calvary Church with Hallison and Putnam. Here there was a large quarry from which the raw material was obtained, and an extensive plant for the shaping of the raw material into the finished product. Trees have completely overgrown the ruined mill and office and water has flooded the quarry, so that little now remains to mark the site of a once flourishing industry.

The quarry noted above is certainly 100 years old, as it is described by Professor Olmsted in his report (p. 15) of 1824, as follows:

The region of sandstone embraces several beds of that conglomerate rock which is used for millstones. But the most distinguished locality for the millstone grit occurs on Richland Creek in Moore County, near the western limit of the formation. . . . This excellent bed of millstone grit is exposed to view directly on the bank of the creek, forming three horizontal strata or layers, each composed of large tabular masses. The lowest stratum is the best quality for millstones. It consists of a hard grayish red sandstone in which are thickly imbedded water-worn pebbles of white flint or quartz. These millstones are very much valued for grinding corn, and are sought for from distant parts of the State, and bring from \$30 to \$100 per pair.

Chance in his report of 1885 (p. 24) makes the following statement: In Moore County the conglomerate at the base of the formation yields an excellent stone for corn-mills. A factory has recently been established by the North Carolina Millstone Co., and complete mills ready for the belt are now made and shipped in large numbers.

This conglomerate was also found on the east bank of Deep River where it is cut by the Deep River fault, about a mile east of the old Endor iron furnace. It was not seen northeast of that place, although the base of the Pekin formation was crossed at a number of places.

At Lockville, a coarse conglomerate occurs on both sides of Deep River at what appears to be the same horizon as that of the millstone grit, but here the matrix is a strong red color and the pebbles or rather the boulders—for they range up to at least twelve inches in diameter are of schist. The rock bears no resemblance to the white quartz conglomerate of the millstone grit, although it seems to be at that horizon. The red conglomerate is well shown in the cuts of the Capital Highway where this road climbs to the upland south of the river and it was also seen in full force on a branch of the Seaboard Air Line Railway which runs due north from Moncure to Pittsboro. Curiously enough, however, this conglomerate does not show on the main automobile road to Pittsboro which turns to the left about one-quarter of a mile beyond Lockport. On this road the schist makes its appearance in less than one-half mile and from that point for about one-quarter of a mile the road runs practically on the contact of the red schist conglomerate and the underlying bed-rock.

Professor Emmons noted (report of 1856, p. 237) this apparent thinning of the Pekin formation at Jones' Falls (now Lockport) and the presence of the red conglomerate noted above, but instead of regarding the conglomerate as the basal member of the Pekin formation, he considered it as belonging to the red sandstones of the Sanford forma-He accounted for its present position as being due to unconformable deposition across the eroded edges of the Cumnock formation. Professor Emmons proved his case, as he supposed, by the discovery of certain fossil plants above the schist conglomerate near Lockville and by the finding on Haw River of the same fossil plants overlying one of the conglomerate beds of the Sanford formation. Whether or not Professor Emmons is correct in attributing the presence of this schist conglomerate in contact with the schist itself as due to overlap the writers cannot affirm or deny, as time did not permit of a close examination of the rocks or of the collecting of fossils from them. In some respects Emmons' theory seems to apply, but in others it is contrary to the observed facts. The writers are not in a position to settle this question, so merely call attention to it as one of the interesting points that future workers may look forward to as a problem worthy of their best efforts.

The other members of the Pekin formation are fairly uniform in character throughout the field and have no striking characteristics that call for comment. Professor Emmons' description of the rocks composing this formation is-very good and the writers can add little or nothing to it, except that in places the formation carries considerable hematite which appears to be very pure, and, if it could be found in great quantity, would be extremely valuable as an ore for iron-making. An exposure of this hematite was found in a cut of the Norfolk Southern Railroad about a half a mile northwest of the station of Colon. This occurs as a mass about five feet long and one foot broad and of unknown depth; it is in sandy shale which strikes nearly east-west and dips twenty-six to thirty degrees to the south. Similar masses, though of smaller dimensions, were seen in the clay pit of the brick works at Colon in shale that also appears to dip to the south. If the dip and strike are at all indicative of the general geologic structure, this shale belongs in the Pekin formation and underlies the Cumnock formation which outcrops farther to the south. The iron ore exposed in the vicinity of Colon is doubtless of secondary origin and due to the segregation of iron in the deeply oxidized shale and shaly sandstone. All of the red rocks of the Newark group contain much iron, but until segregation takes place, the iron is too widely disseminated to be of value as an ore.

CUMNOCK FORMATION

General Statement. The coal-bearing rocks are not so well exposed as are those belonging to the Pekin formation. In fact, were it not for the section in the mine shaft at Cumnock, geologists would have a very inadequate idea of the composition of the coal-bearing formation in this field. Because the shaft section is regarded as the type of the formation and because the development of the coal has been much more extensive here than at any other place in the field, the name Cumnock is given to the generally light-colored rocks bearing coal or associated with the coal. The Cumnock formation varies greatly in thickness and composition throughout that part of the field examined so that it is doubtful if the section exposed in the Cumnock mine will hold in distant localities.

The Egypt (now Cumnock) shaft, shown on Pl. III, was sunk, according to Captain Charles Wilkes¹ of the United States Navy, by the Governor's Creek Coal and Iron Company, but local information gathered in the field indicates that the shaft was sunk by Brooks Harris in 1852, and that Harris in 1853, disposed of his interest in

¹Report on the examination of the Deep River district, North Carolina Senate, Doc. 26, 35th Congress, 2d Sess., p. 6, 1859.

the property to Thomas Andrews, who, in the same year organized the Governor's Creek Steam Transportation and Mining Company. The geologic world is greatly indebted to Captain Wilkes for preserving a record of the rocks penetrated by this shaft, for, so far as the writers are aware, his is the only report in which the original section was published and even the present owners of the property have no other record than that given in Captain Wilkes' report.

Emmons' description (Report of 1856, pp. 232-234) of the Cumnock formation and its thickness and component parts is somewhat vague and indefinite and the writers are not satisfied that they have correctly interpreted his statements. He apparently divides the coal measures into two parts: (1) the black and green beds of the bottom and, (2) drab-colored beds at the top. The thickness of the former is given as extending 150 to 200 feet above the top of the Cumnock shaft section and 200 feet below its base. This would give the black and green beds a thickness of about 800 feet. The drab-colored beds he states are 1,200 feet thick on McIver's plantation near Egypt. These measurements give a total thickness of about 2,000 feet, but Emmons states clearly that the formation is probably thicker at Egypt than it is at any other place in the field.

In comparatively recent years four core-drill holes have been put down to the Cumnock coal bed on the Cumnock property, and as one of these holes penetrated the coal bed at a depth of 1,064 feet 7 inches it affords an even better section than that revealed by the Egypt shaft. The logs of these four wells and also the section of the Egypt shaft, as given by Capt. Wilkes, are shown on Figure 1.

In borehole No. 1 the lowest red rock penetrated by the drill is 548 feet above the Cumnock coal bed; in borehole No. 2 it is 561 feet; and in borehole No. 3, 506 feet. The average of these measurements is 538 feet. If all the exposures in the field were as clear as the logs of the boreholes there would seemingly be little difficulty in determining the top of the Cumnock formation, but in deeply weathered rocks it is not always possible to distinguish brown from gray unless both rocks are strongly marked. Judging from the experience of the writers in the field, it seems highly probable that the brown sandstones and shales noted in logs, 1, 2, and 3 (see Fig. 1) are in reality included in the Cumnock formation, and that as so constituted, it extends 800-850 feet above the Cumnock coal bed and from 100 to 150 feet below that bed. On this assumption the Cumnock formation at the Cumnock mine is about 1,000 feet thick, instead of 2,000 feet, as determined by Emmons.

¹It is possible that Emmons intended this measurement of 1,200 feet to include the rocks showing in the Egypt shaft. If so, it would represent the full thickness of the Cumnock formation, and would be more nearly in accord with, but still thicker than, thicknesses determined in surrounding acres. The statements, however, are too vague to be taken seriously.

The writers endeavored to apply the Cumnock shaft section to the same belt of rocks observed in other parts of the field, but there seems to be little or no agreement in the thickness of either the formation as a whole, or its various members. In fact in several places the formation appears to be lacking, either faulted out or replaced by red conglomerate similar to that which constitutes the major part of the Sanford formation overlying the coals.

Emmons, in his report of 1856, states that he experienced difficulty in tracing the belt of drab sandstone and shale which constitute the

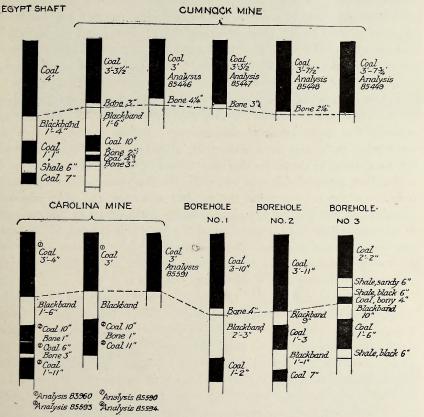


Fig. 1. Section of the Cumnock formation, as exposed in the Cumnock shaft and in boreholes on the Cumnock property.

upper part of the Cumnock formation. He attributed the apparent variation in thickness and even the absence of the coal-bearing rocks in certain places to an unconformity at the top of the drab member (Cumnock formation) which allowed the lowest bed of the upper red sandstone to overlap and conceal a part or the whole of the coal-bearing member. The present writers looked in vain for indications of such an overlap,

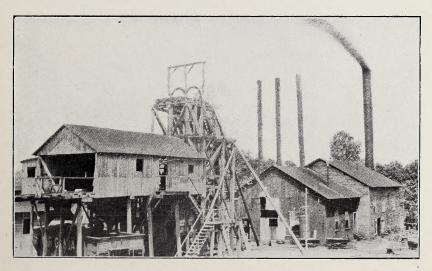
but none was found, and they came to the conclusion that the apparent thinning and even disappearance of the Cumnock formation could be explained in another way which seems to agree with observed facts better than does the theory that Emmons advanced. The theory adopted by the present writers is that the difference in the formation is due in large part, if not wholly, to variations in sedimentation and consequently, red shale, sandstone or even conglomerate may have been laid down in one part of the field at the same time that drab shale or even shale containing much black carbonaceous matter was being deposited in another part. In fact it seems much more reasonable and in accord with observed facts to assume that coal-forming swamps were of local occurrence in Triassic time in much the same manner as they are limited today and that a swamp extensive enough to cover North Carolina from north to south is much less probable than one five, ten, or even twenty miles in extent.

In order to present some of the evidence regarding the variation of the Cumnock formation in this field it will first be necessary to describe the distribution of the outcrop. Before beginning such a description it is well to explain that, although the territory covered by the writers, as shown on the map, extends from Carthage to beyond Haw River, much of this area was examined in a reconnaissance manner only, in order to determine the general structure and that detailed examination was limited to localities where the prospect of finding coal in commercial quantity is more promising than it is in most of the area represented on the map. The description begins at the southwest extremity of the area and extends northeastward to the farthest point examined in the vicinity of Moncure.

In the Carthage Trough. On the new-cut highway which extends northwestward from Carthage the rocks are excellently exposed from a point about 1½ miles west of the courthouse at Carthage to the northwestern margin of the field. The rocks as far as the crossing of Richland Creek are prevailingly red and as they dip continuously to the southeast, they without doubt belong to the Sanford formation. The red rocks continue beyond the creek for a distance of about 400 feet where they rest conformably upon light-colored rocks of the Cumnock formation. These rocks extend along the highway, except where they are cut by a large dike near the middle of the belt, for a distance of 2,200 feet, and to all appearances they are conformable and the full thickness of the formation is present. The rocks near the dike are somewhat disturbed, but beyond its influence they dip with considerable regularity sixteen degrees to the southeast. This dip, if it were regular throughout the entire formation would indicate a thickness of only



A. The Cumnock coal mine.



B. The Cumnock coal mine.



600 feet. As this measurement is much less than that obtained a few miles to the north, as explained on another page, one is forced to the conclusion that either the Cumnock formation is here unusually thin or that it has been cut by a fault and part of the formation has disappeared in the process. The fault-hypothesis seems hardly tenable as in other longitudinal faults of considerable magnitude in this region the movement has been such as to duplicate a part or all of the outcrop and thus give it a greater width and the formation an apparently greater thickness than it normally has rather than to reduce the width of its outcrop.

The rocks exposed are principally gray sandstone and drab shale, but near the dike the shale has been baked to a dark, almost black color resembling black carbonaceous shale. No sign of coal was observed but reports are current that coal has been seen in Richland Creek somewhere in this vicinity. It is possible that coal is present here, for it is only eight and one-half miles in a direct line to the old coal mine on the Jones' farm east of Glendon, but whether or not the coal is of workable thickness here is another problem that can be solved only by prospecting with pick and shovel, or with a core drill.

The next line of observation is along the public road from Mooshaunee to Friendship Church. As this road has never been improved there are few exposures, but so far as the surface indications go, there is no evidence that the Cumnock formation crosses this road. The same condition holds on all of the roads crossing the territory west of McLennon's Creek and for a distance of five miles northeast of the Randolph and Cumberland Railroad. This country was crossed on the road leading to the southeast from Putnam, also on the road running in a similar direction from Cool Springs Church, and on a road intermediate between the two. On all these roads the only rocks that were seen are red rocks which in all probability belong to the Pekin formation.

The next line across the field on which traces of the Cumnock formation were found is the Carthage-Glendon road. As far north as Cole's Mill the roads both to the south and the west of the main road gave no indication of the light-colored rocks of the Cumnock formation; in fact, there seems to be no possibility of the northeastward extension of the belt of outcrop of the Cumnock formation, showing on the Charlotte road northwest of Carthage, for the road from Carthage to Mooshaunee and also the road from Carthage to Cole's Mill shows nothing but red rocks which, unless the Cumnock formation changes in color in this locality, cannot belong to that formation. Likewise the

road from Cole's mill to Mooshaunee is on red rocks from one of these places to the other.

On the west side of the Glendon road, about one and one-half miles north of Cole's Mill, the Cumnock formation suddenly appears in full force, for its outcrop extends from the Carthage-Glendon road for fully one-half mile to the west. From this place northward the light-colored rocks were seen at a number of places as also were the bands of black shale which are a characteristic feature of the formation. The black shale is particularly well exposed and prominent by the side of the road near the forks where the road to the Horseshoe bridge turns off to the right from the regular Glendon road. The Cumnock formation was also seen on all the roads turning to the northwest from the main Carthage-Glendon road toward Putnam and Cool Springs Church. On the main Glendon road nearly the full width of outcrop was seen on the slope northward toward McLennon's Creek, and the contact between the light-colored rocks of the Cumnock formation and the red beds, which are supposedly of the Pekin formation, were crossed three-quarters of a mile from the point where the road forks and the right hand fork leads to Horseshoe Bridge. Between that point and the creek and also on the northwest side of the creek for some distance no rocks but those which are red were seen, but at a fork of the road about one mile north of the creek, with one branch turning to the left toward Cool Springs Church and the other turning off the main road to the right toward the old coal mine on the Jones property, the light-colored rocks of the Cumnock formation appear in outcrop. This band of outcrop is only 900 feet wide, being about one-third of the normal width of outcrop of the entire formation. The dip of the Cumnock formation could not be determined here as the rocks are soft and massive and no bedding planes could be detected. North of this narrow band of outcrop the rocks are universally red as far as the bridge across Deep River north of Glendon where the red beds of the Pekin formation rest upon the crystalline schist.

The two bands of outcrop of the Cumnock formation, mentioned above, can be traced northeastward until they unite two miles southwest of Carbonton. Thus there is a main band of outcrop of the Cumnock formation from a short distance north of Cole's Mill northeastward through the Horseshoe Bend of Deep River and on to Carbonton which appears to be the normal outcrop on the northwestern limb of the Carthage trough; and a second band of outcrop which begins in a sharp point one-half mile southwest of the Carthage-Glendon road, increases in width to 900 feet where it crosses the road just mentioned, and gaining the full width of outcrop soon after it crosses Deep River

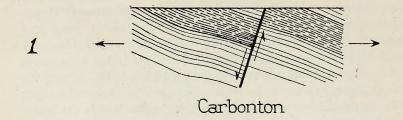
and before it reaches the village of Haw Branch. This belt of outcrop continues northeastward to the vicinity of Carbonton where it appears to blend with or unite in some manner with the other band of outcrop lying to the south.

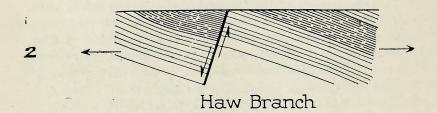
There are therefore two problems here that call for an explanation: (1) The failure of the outcrop of the Cumnock formation on the Carthage-Charlotte road to connect with the outcrop of the same formation north of Cole's Mill, and (2) the bifurcation of the outcrop of the Cumnock formation between Carbonton and Haw Branch.

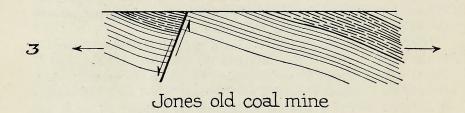
Several explanations might be offered for the solution of problem No. 1, but each one is open to some objection which, in the light of the evidence at hand, appears to be fatal. The possible explanations that should be considered by any geologist working in this field in the future are as follows:

- (A) That the outcrop of the Cumnock formation, as known north of Cole's Mill, really swings to the west and connects with the outcrop of the same formation on the Carthage-Charlotte road west of Richland Creek, and that, owing to poor exposures, it was not observed north or northwest of Mooshaunee.
- (B) That the Carthage trough here has been cut by a cross-fault and the part south of the fault has been dropped with reference to the part north of the fault. This might explain the offset of the Cumnock formation, but it is difficult to conceive of such a fault occurring without leaving some offset in the line of contact between the Pekin formation and the underlying schist.
- (C) That the disappearance of the typical Cumnock formation in the region between Cole's Mill and the Carthage-Charlotte road is due to a local change in sedimentation, by which the generally drab rocks of the Cumnock formation are displaced by red sediments similar to both the overlying and the underlying formations and hence are indistinguishable from them.
- (D) That there is here an overlap of the red rocks of the Sanford formation across the upturned edges of the rocks of the Cumnock formation, which conceals all indications of the presence of the latter formation.
- (2) The question of the bifurcation of the outcrop of the Cumnock formation between Carbonton and Haw Branch is simpler, but of somewhat greater economic importance, because it affects the formation where it possibly contains a workable bed of coal. Such a bifurcation, as that shown on the map, could have occurred in only one of two ways: being the result of either a low fold or wrinkle on the side of the large trough, or of a normal fault which has dropped the block

STRUCTURE PRODUCED BY FAULTING





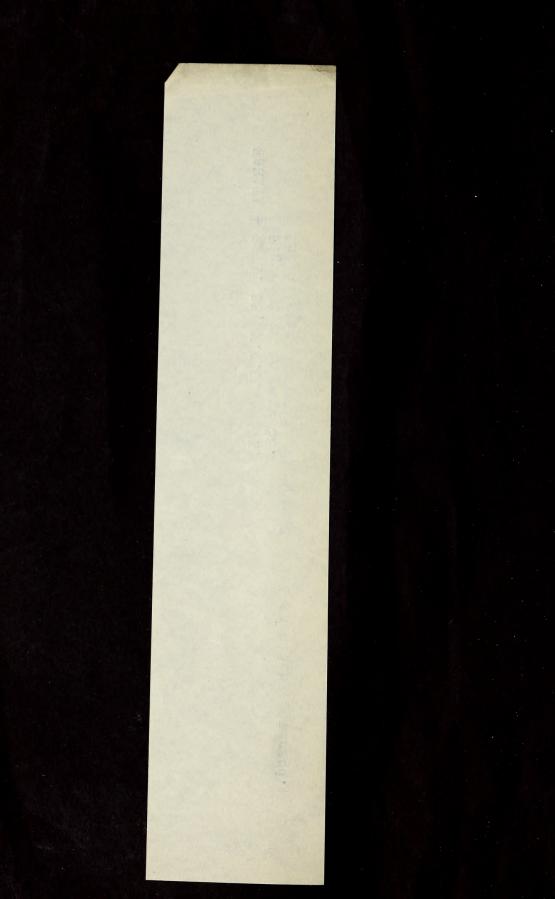




Horseshoe Bend of Deep River

Geologic Structures

Figure 2 is on page 32.
The diagrams shown as figures 3 and 4 should be reversed.



of rock on the northwest side or raised the one on the southeast side, so that the outcrop of the Cumnock formation is repeated for a distance of about three and one-half miles. The fold hypothesis is the simpler one and, in regions in which the rocks are subject to such disturbances, it would be accepted without much question, but in this trough folds in the rocks are almost unknown and normal faults are the rule, hence in all probability the bifurcation of the outcrop of the Cumnock formation is due to a fault which cuts the outcrop at a slight angle, as shown in Figure 2 and described more fully under the subject of Geologic Structure.

The trace of this fault follows the southern margin of the belt of outcrop that passes through Haw Branch and, if it extends northeastward as it probably does, it must pass somewhere to the southeast of Carbonton, but its position was not determined, for at the time of the field examination the presence of this fault was not realized. wide floodplain of Deep River about Carbonton makes the collection of data bearing on the position of the fault difficult, but it seems probable that if search were made in the vicinity of the site of the old village some evidence of the inter-fingering of the light-colored rocks of the Cumnock formation and the red rocks of the Sanford formation would be found. The representation of the fault on the map as well as the outcrop of the formations southeast of Carbonton are largely hypothetical, but they serve to express the idea that the writers hold that probably there is at this place a fault which separates an upraised block of the earth's crust on the southeast from a dropped block on the northwest, and the junction of the two belts of outcrop of the Cumnock formation in the vicinity of Carbonton merely means that here the fault passes across the Cumnock formation and farther northeast lies entirely within the Sanford formation, or at least is in this position for a number of miles. On this assumption the belt of outcrop of the Cumnock formation which extended into this area from the Horseshoe Bend of Deep River comes to an end in a sharp point somewhere in the vicinity of Carbonton, and the belt lying to the northwest and passing through Haw Branch continues on to the northeast through the present village of Carbonton to Gulf. No direct measurement of the thickness of the Cumnock formation was made in the vicinity of Carbonton, but in constructing the cross-sections shown in Fig. 2 it was found that, according to observed dips and details of distribution of outcrop, the formation must be at least 1,000 feet thick.

From Carbonton to Gulf the base of the Cumnock formation is quite well marked on the ground and its position in a number of places was accurately determined. This line is nearly straight, the only

irregularities being those due to the influences of dikes which are very abundant and seemingly cut the coal nearly parallel to the outcrop. The upper limit of the formation was not nearly so well determined as the lower limit, for it follows in a general way the floodplain of Deep River, and this floodplain is so broad that it was not thought practical to seek for evidence regarding the exact position of the upper limit of the formation.

East of Gulf the writers, when in the field, were puzzled by the apparent lack of parallelism between the line marking the lower limit of the Cumnock formation and the line marking the upper limit. No attempt was made to actually follow the lower boundary of the formation from Gulf to the Cumnock bridge, but it was assumed that it is regular and conformable in its curve and direction with the line marking the base of the Pekin formation nearly two miles to the north. Considerable data were obtained on the upper boundary of the Cumnock formation and it was found not to be conformable with the line marking the base of the Pekin formation, but to offset decidedly to the south at a distance of about a mile from Gulf. A careful study of the compiled map shows at once that the point here in question lies almost on the continuation of the supposed Carbonton fault and that if it were granted that this fault might continue as far to the northeastward as this place, it would account for the irregularity in the upper boundary of the Cumnock formation.

All of the facts in the hands of the writers indicate that the line marking the top of the Cumnock formation crosses Deep River about 700 feet below the bridge at the old mill directly south of Gulf. This does not agree with the statement made by Chance (pages 13-14) that at the old coal mine which was once opened west of the village, and which was abandoned because in a short distance a large dike was encountered, red sandstone appears directly south of this great dike. It is also well known that deep drilling was done here years ago, but no authentic account of the results could be obtained; there is, however, a vague rumor that a well near the river bank found the coal at a considerable depth and that most of the rocks penetrated near the surface are the red rocks of the overlying formation. If these rumors are correct, the geology about Gulf is very complicated and different from that which is represented on the present map, but the writers, while not making a special examination of this particular locality, have no hesitation in saying that the evidence collected in the surrounding territory does not agree with such an interpretation as would have to be made if the rumor mentioned above were correct, and hence they are inclined to class this hearsay evidence as too vague and indefinite

to be seriously considered, unless it were substantiated by a detailed examination.

As stated before, the writers believe that the line marking the top of the Cumnock formation crosses Deep River a short distance below the bridge, but this line if projected to the east would not include a great mass of light-colored sandstone which shows still farther down the river and at an old quarry about half way between the river and the line of the Southern Railway, about a mile southeast of Gulf. this apparent offset in the upper boundary of the Cumnock formation is on the prolongation of the Carbonton fault, it is suggested that perhaps this fault is longer than has been supposed and really is responsible for this offset as well as the much larger offset of the same formation southwest of Carbonton. This idea of the extension of the fault is offered more in the nature of a suggestion than as an established fact and should be considered by any coal operator who is interested in the development of this part of the field. As the evidence in the vicinity of Haw Branch shows that the fault which is supposed to be responsible for the offsets in the Cumnock formation is diminishing in throw or magnitude northeastward, it is probable that south of Gulf it may not have lifted the coal bed more than 100 feet and it probably dies out before it reaches the schist at the northern point of the syncline. As the movement on the fault plane was such as to cause the block of rock on the southeast side of the fault to move upward with respect to the block on the northwest side, both the upper and the lower boundary of the Cumnock formation will be found to offset to the southwest, but for only about 1,500 feet for the lower boundary and 4,000 feet for the upper boundary, the difference being caused by the increasing magnitude of the fault toward the southwest and the different angle at which the fault cuts the boundary line.

From the offset just described to Cumnock and the Carolina mine the outcrop of the Cumnock formation appears to be exceedingly regular and without offsets of any kind. It is possible, however, that if it could be followed in detail, small offsets would be found for some small faults have been encountered in the mines which would doubtless produce such features where they come to the surface, but they are so small that it would be almost impossible to detect them.

As Offset by the Deep River Fault.—East of Cumnock and the Carolina mine the outcrop of the Cumnock formation is more complicated than it is at any other point seen by the writers. As those working in the coal of this region are in doubt about the continuation of the beds the writers spent considerable time tracing the outcrop between the points at which the coal has been prospected in the vicinity of the

Carolina mine and the Capital Highway north of Sanford. Professor Emmons, in his report of 1856, gives a colored geologic map of the Cumnock formation from the present village of Carbonton to Cape Fear River. One of the most interesting features of the map is the great bend which he supposed the outcrop of the formation to make just east of Farmville (now the Carolina mine) and the swing to the southwestward across the river some distance east of the old Endor iron furnace below the mouth of Buffalo Creek. The outcrop of the Cumnock formation is represented as continuing in this direction to beyond the house of Evander McIver where it turns abruptly to the southeast, paralleling approximately the line marking the contact of the Pekin formation and the underlying crystalline schist. Emmons gives no facts in support of his conception of the great bend in the outcrop of this formation, merely stating in the text (p. 244) that, "The outcrop crosses the river between Evander McIver's and the Hornville property, thence by Farmville, it crosses the river obliquely at Egypt, and soon recrosses it again near the fish-trap, and passes into the Taylor plantation." Naturally the writers made a very detailed examination of this part of the field, for the interpretation of the structure necessarily has an important bearing upon any conclusion regarding the area and tonnage of available coal.

The position of the outcrop of the Cumnock coal bed from Gulf to the Carolina coal mine (Farmville of the old reports), barring a hypothetical offset, is quite well known and the writers were able by means of prospect pits to continue the tracing southeastward beyond the Carolina mine to the edge of the flood plain, about 1,300 feet from Deep River at the bend where the course of the river changes from nearly due east by the mouth of Pretty Creek to a northward course toward Woodard's Bridge. As the outcrop of the coal bed shows no trace of irregularity save a gentle curve toward the south, one would scarcely expect in a distance of 1,300 feet a decided change in direction of the outcrop of the formation. When, however, one tramps from Woodard's Bridge up the river bank on the southeast side he finds high hills of schist opposite the mouth of George's Creek and even further south, and when he reaches a point in strike with the outcrop of the coal at the last prospect pit, he finds equally high rugged hills made of a white quartz conglomerate, in all respects similar to the millstone grit exposed on McCallum Creek. conglomerate strikes N. 35° E. and dips 15° southeast, it will be seen at once that it is out of harmony with the coal outcrop and also with Emmons' hypothesis that the outcrop of the coal swings abruptly to the southwest across Deep River.

In order to test Emmons' hypothesis still further, the rocks, showing on the south side of the river from the mouth of Buffalo Creek down stream to the bend mentioned above, were carefully examined as to their character and attitude, but nothing was found that would in any way support it. The rocks throughout this stretch of river are prevailingly red and do not belong to the Cumnock formation. strike of the rocks from the mouth of Buffalo Creek to the mouth of Pretty Creek are parallel with the outcrop of the coal bed from the Carolina mine to the river flood plain, and as the dip is to the southwest in conformity with that of the coal, it is apparent that the red sandstone at the site of the old Endor iron furnace overlies the coal bed and hence belongs to the Sanford formation. East of the mouth of Pretty Creek the rocks are nearly horizontal, red sandy shale. these in all probability overlie the quartz conglomerate noted above in the river bluff, a few hundred feet to the north, they must belong to the Pekin formation.

From all the evidence collected in the field, it seems certain that the Cumnock formation, including the workable coal bed of the same name comes to an end suddenly near the last coal prospect mentioned above. The reasons for this conclusion may be summarized as follows:

(1) If the coal were assumed to cross the river on its regular course it would strike at right angles the basal conglomerate of the Pekin formation, which of course, without the intervention of a fault, is impossible; (2) if the coal bed swings, as supposed by Emmons, to the southwest, it would come in contact, in the vicinity of the site of the old Endor furnace, at right angles with the red sandstone of the Sanford formation. As each of these assumptions results in an absurdity, they cannot be regarded seriously.

The only theory that fits the known facts is that the Cumnock formation, including the coal bed, is cut by a normal fault near the first coal prospect pit, west of Deep River. The movement on this fault plane, which probably is nearly vertical, has been such as to raise the rocks on the east relative to those on the west, or to drop those on the west relative to those on the east about 2,500 feet so that the Cumnock coal bed comes in contact on this fault plane with the base of the Pekin formation or with the underlying schist on the east side of the fault. The fault swings somewhat to the southwest and crosses Deep River at or near the mouth of Pretty Creek. The real test of the fault-hypothesis is whether or not boundaries other than those of the Cumnock formation are offset in a similar manner and to a like amount.

The first boundary line to be tested is that marking the base of the Pekin formation or the contact between that formation and the underlying schist. This boundary was located on the road running nearly north from the bridge across Deep River at Cumnock, as shown on the accompanying map. It was also determined on the road from west of the Carolina coal mine to the Sanford-Pittsboro road. This also is shown on the map. The base of the Pekin formation as represented by these points is roughly parallel to the outcrop of the coal bed and at the last mentioned place the boundary swings to the southeast in almost exact conformity to that of the coal bed. As the outcrop of the coal bed could not be followed to the supposed faultline, it was essential to trace the contact of the Pekin formation and the schist southeastward from this road as far as it extends. This line was crossed almost due south of the point where the road from the Carolina mine intersects the Pittsboro road. When platted this point proved to be on the extension of the contact line from the west and afforded no indication of being near the end of the Pekin formation. Again the contact was crossed near Deep River where the stream turns from due north to almost east, a course that it follows to Woodard's Bridge. Here at a point 800 feet north of the river the contact was again found, or at least fragments of a quartz conglomerate, which undoubtedly is the basal conglomerate of the Pekin formation, were found on schist. North of this point nothing but schist fragments appear on the surface and south of the point nothing was seen on the surface but fragments of conglomerate and brown sandstone. It was found that this point is in line with the other points to the west in indicating a gently southward curving boundary line similar to that marking the outcrop of the coal bed. West of this point all indications point to perfectly normal relationships, but east of the point there was nothing to be found but schist and it was found that this schist extends south to the river where it shows as a ledge projecting into the north side of the stream. Here, as further north, brown sandstone fragments are abundant to the west of the schist so that it is concluded, and seemingly without the possibility of error, that this line of contact between fragments of sandstone and conglomerate on the west and schist on the east marks the line of the fault.

From the point described above southward (up stream) all the rocks exposed on the west side of the river belong to the Newark group, but all those on the east, as determined by a foot-traverse along the river bank, are schist up to the next great bend in the course of the river where it turns from an easterly to a northerly course. As the rocks on the west are Newark and on the east schist it is obvious that the fault follows closely the flood plain of the river and

consequently its exact position cannot be determined. Where the fault crosses the river east of the mouth of Pretty Creek it is in the midst of red rocks and here its position can only be inferred.

As shown on the map, the line marking the base of the Pekin formation is offset to the south by this fault one and one-half miles. It seemed probable, therefore, that the coal outcrop would be found on the east side of the fault about one and one-half miles to the south of the last pit noted southeast of the Carolina mine.

Professor Emmons in his report of 1856 mentions the occurrence of coal near the house of Evander McIver and at Martin Dyer's, although he does not give the thickness of the coal bed at either place, except to say that a boring at Martin Dyer's disclosed 10 inches of coal. The Martin Dyer farm is on the main Capital Highway two and one-half miles from Sanford and about one-quarter of a mile south of the "Old Cumnock" road. Evander McIver lived on this road a little more than two miles from the Capital Highway and about three-quarters of a mile from the crossing of the Southern Railway.

According to local reports the coal was mined quite extensively during the Civil War in Pretty Creek north of the McIver house. These old mines were located by the writers and the belt of lightcolored Cumnock rocks was followed, as indicated on the map, southeastward to the Capital Highway. In the opposite direction the rocks are poorly exposed, but light-colored shale associated with fine fissile black shale was found in a cut on the Southern Railway nearly a mile south of the crossing of the "Old Cumnock" road. As cuts on the railroad just south of this crossing are in thick-bedded red sandstone, it seems probable that the outcrop of the Cumnock formation trends nearly due west from the McIver house to the valley of Buffalo Creek. As all of the rocks in the upland west of this creek are red, the belt of Cumnock formation must be cut off suddenly somewhere in the valley of Buffalo Creek by a fault which brings the Cumnock formation on the east side in contact with red sandstone and shale of the Sanford formation on the west. In other words, this is the same fault as that which was discovered north of Deep River, and the offset of the principal coal bed is about one and one-half miles, or the same as the offset of the base of the Pekin formation.

The evidence in this part of the field is perfectly clear that the geographic distribution of the Cumnock formation, as noted by Professor Emmons and as found by the writers, is the result of a normal or nearly vertical fault or break in the rocks which has affected not only the sandstone, shale, and conglomerate of the Newark group, but also the underlying crystalline schist. It is impossible on account of

the similarity of the schist on the two sides of the fault, to trace the fault far beyond the outer boundary of the Pekin formation and in the other direction it is equally difficult to trace it far into the interior of the Carthage trough, because here it is entirely within the Sanford formation and the red sandstone, shale and conglomerate in one part of this formation are so like those in another part that they are indistinguishable.

On the map the fault is shown for only a few miles south of the Evander McIver house, but with a displacement at the river of at least 2,500 feet, it seems probable that it extends much further, possibly as far as to the vicinity of Carthage.

East of the Deep River fault the tracing of the outcrop of the Cumnock formation is extremely unsatisfactory because of the blanket of quartz pebbles on the higher land, the heavy forest which prevails over most of the country in this region, and the probable complicated structure which seemingly has resulted in the dislocation of the band of outcrop into a number of isolated areas.

The first of these isolated areas of the Cumnock formation extends southeastward from the Deep River fault to something more than a mile east of the Sanford-Colon Highway. The coal beds in this formation have been prospected in the valley of the upper part of Pretty Creek just north of the "Old Cumnock" road. The outcrop of the formation follows this road from a short distance east of the Atlantic and Yadkin (Southern) Railway to the Capital Highway, two and three-fourths miles north of Sanford. The light-colored rocks of the formation are well exposed in a cut on the Seaboard Air Line Railway about the same distance from Sanford where they strike N. 60° E. and dip 30° to the southeast. Fragments of the light-colored rocks marking the southern boundary of the Cumnock formation may be seen on the road from Sanford to Colon at a distance of one and threefourths miles from the main street leading nearly due east from the center of Sanford. From the last mentioned place the outcrop of light buff sandstone was traced continuously nearly due east through the forest for a distance of one and one-half miles to the zone of dikes which passes a little north of west through the village of Colon on the Seaboard Air Line and the Norfolk Southern railroads.

East of the Sanford-Colon Highway the belt of light-colored rocks appears to grow narrower and narrower towards the east until it disappears as stated above, in the zone of dikes. It is probable that other bands of light-colored rocks may extend into this forest-covered region, but, if so, they are separated by red conglomerate which probably interfingers with the light-colored sandstone and shale. The writers

are strongly of the opinion that, as the southeastern margin of the trough is approached, the Cumnock formation is split up by layers of red rocks which increase in number and thickness until possibly the light-colored rocks of the formation are entirely replaced by red sandstone, shale, and conglomerate that cannot be differentiated from the overlying and underlying rocks. If the northeastward termination of the Carthage trough as explained later under the heading "Geologic Structure," is due to the formation of a cross-anticline in the vicinity of Colon, then the outcrop of the Cumnock formation should, if it were unbroken, extend in general eastward south of Colon until it reaches the axis of the cross-anticline and then it should loop back to the northwest in a line nearly parallel with, but departing more and more to the northward from the outcrop already described, until it reaches the point where it turns northeastward along the rim of the Corinth trough.

The writers examined this part of the field with considerable care in order to determine whether or not the outcrop does swing back on the north side of the Colon anticline, but no trace of it could be found. As the outcrop extends only as far east as the dikes mentioned before it seems probable that the formation is cut off by a fault which follows the course of the dikes and possibly passes through and is responsible for the sharp angle in the line marking the base of the Pekin formation near the Capital Highway and the Norfolk Southern Railroad. The reason for this supposition will be more fully considered under the heading "Geologic Structure."

In the Corinth Trough.—From Colon northeastward to Zion Church a careful examination was made for any drab shale or light-colored sandstone that might indicate the presence of the Cumnock formation, but none was found. In most cases the outcrops are so poor that one cannot be certain that light-colored rocks are not present, but one section was found that shows almost continuous exposures of red rocks from near the Capital Highway on the northwest to the Osgood-Zion Church road on the southeast. This section is on a road which leaves the Capital Highway at Jones Chapel and intersects the Osgood-Zion Church road about a mile north of Osgood and the rocks dip continuously to the southeast throughout practically the whole of this section. Here apparently is a line across which the outcrop of the Cumnock formation does not pass, unless its rocks are different from those which are generally recognized as typical.

Although the Cumnock formation is absent in the section just mentioned, it comes in suddenly, and with its characteristic light drab color, only a mile or so to the northeast, as shown by a coal prospect

and associated light-colored rocks in the proper position to be in the Cumnock formation. One-half mile north of Zion Church a thin layer of coal, only a few inches thick has been exposed in a pit dug on the farm of Morris Holt. Here adjacent bands of gray sandstone lying both above and below the coal bed and also the debris of light-colored sandy shale that cumbers the hillsides in the vicinity, all point to the fact that a belt of light-colored rocks strikes parallel with the boundary of the field and dips normally to the southeast at an angle of 25 degrees. The width of this belt of outcrop was not determined, but where the belt is crossed by a small stream near the coal pit, the light-colored rocks were seen for a distance of several hundred feet on either side of the pit.

The coal prospect noted above on the Holt farm, appears to be the same as that mentioned by Professor Emmons in his report of 1856 (p. 244) as occurred on the Rhiney Wicker (Ellington) property. He notes that the coal bed here is less than three inches thick, and this agrees exactly with the statement of Morris Holt, who a few years ago sunk a pit to the coal bed. Professor Emmons, however, does not regard this belt of coal-bearing rocks as occurring in the Cumnock formation, but thinks that it is associated with the upper red sandstones and conglomerates (Sanford formation) and not the same as the rocks exposed in the Cumnock shaft. His conclusions were based on the proximity of a fossil plant-bearing shale to the coal and sandstone. It is true that, although the succession of strata from the schist upward is practically the same as it is at Cumnock, the thickness of the Pekin and the Cumnock formations is very much less. The data at hand do not permit of an accurate measurement of these formations at the Morris Holt farm, but the Pekin formation is probably about 1,000 feet and the Cumnock formation not more than 800 feet thick at this The present writers have carefully considered all of these points, and, though they regard Professor Emmons' conclusions as possible, the succession of beds strongly suggests that the formations are the same as those that have been observed farther west.

Although the writers believe that the coal on the Morris Holt farm is in the Cumnock formation they must admit their inability to explain the disappearance of this formation in the district about Colon. Here then is a case of disappearance of the Cumnock formation, very similar to the disappearance of the same rocks in the vicinity of Mooshaunee which was described on another page. The only difference in the two cases is that south of Colon there is positive evidence that the formation changes in character by the occurrence in it of beds of red conglomerate which cannot be distinguished from

the red conglomerate of the Sanford formation, and it is possible that, if the outcrop of the formation could be followed to the southwest from the Morris Holt farm, it likewise would be found to split and become red by the introduction of red conglomerate between the layers of drab or gray sandstone and shale.

From the farm of Morris Holt the outcrop of the Cumnock formation probably extends continuously northeastward beyond the limit of the territory represented by the map accompanying this report, but it is not well shown at any point visited by the writers. Light-colored rocks were seen on the southwest side of Deep River on the road from Osgood to Lockville and on the northeast side of Deep River in the vicinity of Moncure. Various rumors were heard in the village of Moncure about coal having been struck in bored wells in the village and also in pits sunk for the foundations of the water tank near the railroad station, but the accuracy of these reports is subject to question. In drilling a water-well in the village the drill is said to have passed through a few inches of black material which may have been coal or black shale. The report that coal was exposed when the foundations of the water tank were laid could not be confirmed by the records in the office of the Chief Engineer of the Seaboard Air Line Railway; therefore the writers conclude that the evidence regarding the presence of coal at Moncure is of very doubtful value and at best does not seem to indicate a thickness of more than a very few inches.

SANFORD FORMATION

The rocks above the Cumnock formation are almost universally red, being composed largely of conglomerate, sandstone and shale in a monotonous succession, which crops out across the trough from the upper limit of the Cumnock formation to the Jonesboro fault. As these red beds are present under and around the town of Sanford that name is proposed for the formation which includes all rocks of Triassic age above the Cumnock formation.

The Sanford formation has little of interest to one seeking for coal, for, so far as known, there are no coal beds in it, and, in fact, very little except red rocks. These consist of red conglomerate, which apparently varies in coarseness according to its nearness to the southeastern border of the field, for from this direction came most, if not all, of the materials composing it. The pebbles, cobbles, and boulders found in the formation were largely derived from the crystalline schist and slate (Pl. IV-A), but the largest boulders observed are of granite (Pl. IV-B), a large mass of which apparently was intruded into the schist just east of the present boundary of the Newark rocks on the east side of Cape Fear River.

The cuts made in grading for the Norfolk Southern Railroad between Colon and Corinth offer the best field for a study of the characteristics of the Sanford formation. In the cuts directly east of Colon the material is relatively fine, few of the individual cobbles being more than six inches in diameter, but near Corinth the material is much coarser, one boulder of granite (Pl. IV-B) near the Jonesboro fault measuring four feet in its longer diameter. A few hundred yards beyond the point where this boulder is exposed in the railroad cut the Sanford formation rests directly against a mass of granite from which the boulder doubtless was derived.

The thickness of the Sanford formation is evidently very great, but no geologist so far has secured sufficient data to make a very reliable estimate. In 1852 Professor Emmons, in discussing this matter, arrived at the conclusion (p. 137) that the thickness of the upper red sandstones (Sanford formation) is 3,000 feet, but confessed that his estimate was vague and of little value, except as a minimum measure, which he thought might be very materially increased, if adequate data were available. At the present time the outline of the field is much better known than it was in 1852 and it is possible to make a better estimate, but even today there are many unknown or variable factors in the problem which render the result only approximately correct.

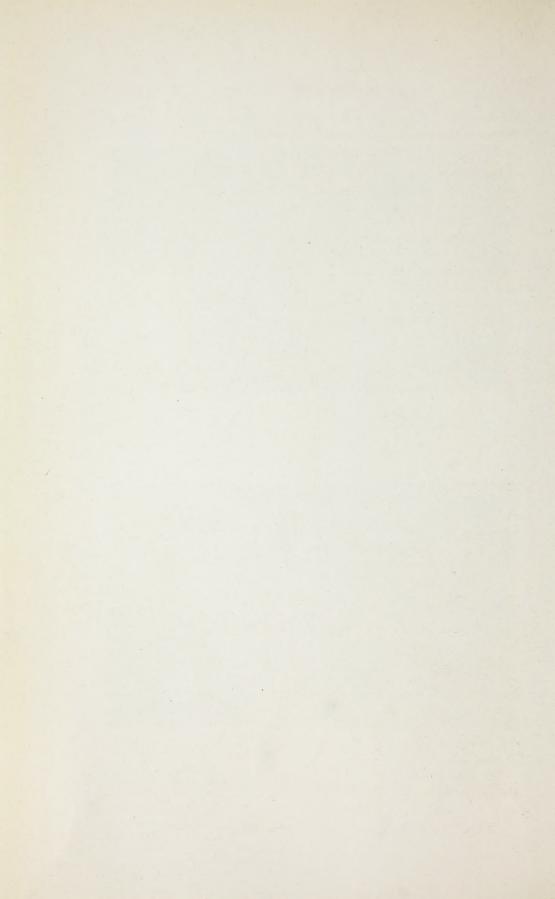
In making an estimate of the total thickness of rocks in the Deep River Coal Field, it is evident that the field is naturally divisible into two parts; the line of separation being in the vicinity of Colon, three miles northeast of Sanford. The trough southwest of Colon is broader and seemingly shallower than the trough to the northeast of that place, hence it seems probable that a greater thickness of rocks is involved in the latter than in the former trough. Although the trough southwest of Colon is shallower, it is more irregular in structure and is not well adapted to a measurement of thicknesses, particularly when it is remembered that all its eastern part is largely obscured by white sand which mantles the hard rocks and almost completely conceals them. For this reason the southwestern trough has been disregarded. The trough northeast of Colon is narrower, but the dips are much more constant across it from one margin to the other; consequently it offers decidedly better opportunities to obtain a reasonably accurate estimate of the thickness of rocks involved, unless it is cut by longitudinal faults which duplicate the measures. best estimate that can be made at the present time is that the Sanford formation is probably 4,000 or 5,000 feet thick. If this thickness is correct then the entire Newark group has a probable thickness of 7,000 to 8,000 feet and the crystalline schist lies at approximately that



A. Boulders of schist in the Sanford formation. View in cut of the Norfolk Southern Railroad east of Corinth. The boulders are badly decayed, but range in diameter up to 16 inches.



B. Boulder of granite in the Sanford formation. This boulder, 4 feet in diameter, shows in a cut of the Norfolk Southern Railroad nearly three miles east of Corinth.



depth below the surface in the vicinity of Corinth on the Norfolk Southern Railroad, east of Cape Fear River.

IGNEOUS DIKES

The rocks of the Newark group, as well as the underlying crystalline schist in the Deep River Field are cut by numerous dikes of diabase, but their outcrops are so greatly obscured by sand, gravel and the forest that the writers made little effort to map them in detail; they were, however, carefully noted wherever they crossed the highways and other lines of travel where their outcrops are plainly visible. An effort was made in a small area northwest of Sanford to trace and map several dikes off the highways, but after one day's experience in tracing the dikes through cultivated fields, woodlands and swamps, it was given up as impracticable.

The dikes, although somewhat irregular in their trend, seem to belong to a great system which in general trends N. 20 degrees W. They are probably fairly evenly distributed throughout the territory, although they are not so represented on the map. This seeming irregularity in occurrence is due in part to the greater number of routes traversed in certain parts of the field than in others, and in part to the better exposures near the river and the larger creeks than there are on the upland, where the blanket of sand and gravel is unusually thick. Although the dikes are present in almost every part of the field, close examination shows that in certain places they are much more numerous than they are in others, and in certain large areas they seem to be absent. When one makes an examination of the outcrop of the Cumnock formation from Haw Branch to Gulf, he is impressed with the frequency with which he encounters dikes or the boulders resulting from the decay of dikes. They seem to follow the outcrop of the coal beds, for they are present at almost every prospect that has been opened for coal in this part of the trough. The parallelism of the dikes and the coal outcrops is certainly true for a distance of a mile or two in the vicinity of Carbonton, but north of Indian Creek there does not appear to be such a close agreement in direction as there is south of that creek. The prevalence of dikes on the outcrop of the coal beds about Carbonton has had a decidedly detrimental effect on the commercial development of the coal. When one compares the general absence of dikes on the ridge which the Sanford-Cumnock road follows for three or four miles south of Cumnock, with their abundance about Carbonton, he is decidedly impressed with the irregularity rather than the regularity of their occurrence.

The composition of the dikes, as shown by a sample collected near the point where the Carthage-Charlotte Highway crosses Richland Creek and another from a cut of the Norfolk Southern Railroad a short distance southwest of Gulf, is that of a typical diabase with only a very little magnetite. This seems strange, as the dikes had such a disastrous effect on the magnetic needle during the present survey, but it is probable that the magnetic attraction is due to the polarization of the dike material rather than to the composition of the rock.

In general the dikes cut the country rock in an almost vertical direction, and in most cases where their bounding walls can be seen they are extremely regular and the thickness of the dike varies but little. In some railroad cuts where the dikes are visible for ten to twenty feet it was found that they are approximately vertical, that they frequently cut through the bedded rocks without causing any deformation, but here and there the sandstone beds on one or the other side of the dike are pushed up out of their normal position as much as twenty degrees, showing that the igneous material was forced up under great pressure and that in places it lifted the country rock out of its normal attitude. One of the best examples of tilting caused by a dike was seen in a deep cut of the Norfolk Southern Railroad on the southwest bank of Cape Fear River in the eastern part of the The photograph of this dike is reproduced as Pl. V-B. As shown by the plate, the dike stands about vertical, but the sandstone on the left which normally outcrops in a nearly horizontal line is tilted or lifted up about twenty-five degrees. The beds on the right are not clearly shown in the cut, but at the time the picture was taken, they were studied with some care and no sign of a corresponding dip was detected.

Although the dikes generally have regular and parallel bounding walls, there are apparently some exceptions to this rule. The most notable case that was seen is a dike cutting the Cumnock formation at the north end of the dam of the Sand Hill Power Company at Carbonton. A part of this dike is shown in Pl. VI-B. The exposure occurs at the end of the dam shown in Pl. VI-A; in fact the camera was resting on the dike when the picture of the dam was taken. On Pl. VI-B the left edge of the dike is indicated by the camera case and the hammers. At this point it comes in contact with the cut edges of the dark indurated shale of the Cumnock formation which here dips to the northwest or away from the observer about ten degrees. The contact of the dike and the shale rises and curves to the right until it reaches the main mass of the dike perhaps eight or ten feet to the right of the rock showing in Pl. VI-B. This contact is sharp and irregular showing that the shale has been broken away by blocks and there is

no suggestion of the country rock having been fused by the heat of the molten mass of the dike. This is one of the best exposures of the walls of a dike that was seen.

The dikes range in thickness from a few inches to about 100 feet, and it is not thought that any dike in this field has a greater thickness than that just given. Some very minute dikes were observed in a homogeneous red sandstone by the roadside just west of McLennon's Creek on the road leading from Carthage to Mooshaunee. Some of these dikelets are no thicker than a knife blade and none exceeds a quarter of an inch in thickness. They radiate in all directions, following a system of minute fissures that doubtless was developed in the sandstone before the intrusion occurred. These dikelets are shown on Pl. V-A.

It is interesting to note that the dikes have a very decided effect on the circulation of underground water and that this fact is utilized in the field. Thus the inhabitants have learned, through long experience, that water can be secured much more readily by sinking wells near a dike than it can in the country rock where there is no dike. From this fact it is evident that the dike serves as a barrier to the circulation of liquids through the rocks and that next to the barrier a pool is formed. If there were any petroleum in the rocks it is probable that it would be affected in a similar manner and consequently any test wells that are put down should be drilled near the dikes or at least so they would strike the porous reservoir near the point where it is cut by a dike. This phase of the subject will be considered at greater length on another page.

From the standpoint of the coal operator, the most important question concerning the dikes is their effect upon the quality of the coal and upon the cost of mining. It is obvious that if a molten mass from 50 to 100 feet thick comes in contact with coal, the coal will suffer considerable change. If a coking coal, such as that in the Deep River Field, is cut by a large dike, it may be changed into any of the following substances: if the coal is near the surface where oxygen is abundant, the coal is liable to be entirely consumed, leaving in its place only a bed of ashes; if less oxygen is available, the coal may be converted into coke; and if the supply of oxygen be very limited the coal may be so baked that it is converted into anthracite. In general, it may be said that these processes go on at different depths beneath the surface of the ground, for it may be assumed that the supply of oxygen in the rocks decreases as the depth below the surface increases, but this increase is doubtless irregular, depending upon many conditions that, from the surface, cannot be foretold. Although it is obvious that the supply of

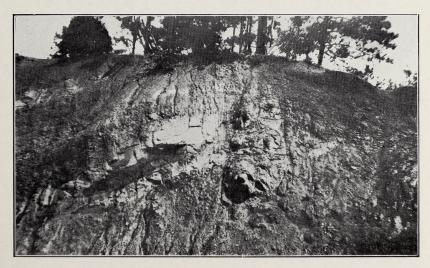
oxygen decreases with depth, it is impossible to say at what depth anthracite is produced or at what depth the coal is converted into coke.

In the Deep River Field, as far as the writers have observed, the coal has been converted into anthracite wherever it has been cut by a dike; therefore, it seems probable that when the intrusions took place the coal that now shows at the surface was buried beneath hundreds, if not thousands, of feet of other rocks belonging to the Newark group, which have been removed in the general erosion of the region. As erosion progresses so slowly that a man can seldom see in his lifetime any appreciable change in the earth's surface, due to this agency, the intrusion must have taken place millions of years ago and probably soon after the rock-making materials were deposited.

As the dikes may not only affect the quality of the coal in a narrow belt on either side, but may also in places tilt the coal bed, as the sandstone bed is tilted in Pl. V-B, they may seriously affect the mining of the coal. Every operator, therefore, who is contemplating the opening of a mine should carefully study and map the dikes, as they show at the surface, so that he may have some idea of what he is liable to encounter at a depth in the mine, and he should also study them with the object of obtaining more data than is at present available to the writers, regarding the attitude of the dikes and the points at which they are likely to intersect the coal bed. If the dikes are vertical, as the writers have been led to suppose, then they should cut the coal bed directly below their exposure on the surface, no matter at what depth the coal may be, but if the dikes are not vertical, then they will not cut the coal directly beneath the point where they show at the surface, but to the right or left, depending upon the inclination of the dike and the depth of the coal bed. It is possible, however, that a dike, which in general has regular walls and which stands vertically at the surface, may suddenly cut across the beds in such an irregular way that its position at a given depth below the surface cannot be predicted with any assurance whatever. The only case of this kind that was observed by the writers is that already described at the dam of the Sand Hill Power Company at Carbonton, but those who are familiar with the habits of dikes know full well that though they may be in general extremely regular in trend and in attitude, they will sooner or later change their courses suddenly seemingly without reason and pursue a totally different course from that followed by the general system. Such eccentricities are to be expected and the operator should watch carefully for them in order to predict where the dikes may be encountered in the mine. Those who conduct drilling operations or who examine drill cores for the purpose of determining the character



A. Minute dikes cutting red sandstone. These dikes which range in thickness from that of a knife-blade up to a quarter of an inch are exposed on the Carthage-Mooshaunee road a short distance west of McLennons Creek.



B. Sandstone tilted by a dike. This view in a cut of the Norfolk Southern Railroad on the southwest bank of Cape Fear River shows how a dike has tilted a bed of sandstone that a short distance away is horizontal.



of the rock penetrated by the drill, should watch carefully for indications of dike material, as it seems probable that many times such material has not been recognized in drill cores and thus only a part of the information which the core should have yielded has been utilized.

GEOLOGIC STRUCTURES

GENERAL STATEMENT

In almost the earliest reports on this region the Newark group is reported as lying in a trough or syncline. Professor Emmons, in his report of 1852 (page 119) refers to it as follows:

The Deep River Coal Field is in the form of a trough. In this coal field, the uplift has been made upon the northwest side. Its line of demarcation is distinct; while, upon the southeast side, there is no outcrop.

In the course of the present examination the idea of the trough-like form of the sedimentary rocks was confirmed in the region represented by the map (Pl. I), and also in a rapid reconnaissance which was made near the southern boundary of the State.

On the line between Richmond and Montgomery counties the Newark sandstone, shale, and conglomerate show in nearly typical form, the three formations described in previous pages of this report being easily recognized. The belt of outcrop has a width of 5 or 6 miles and lies about 4 miles east of Mount Gilead in Montgomery County. The southeastern border of the belt is clearly marked by Pea Ridge which is formed of the crystalline schist and igneous rocks. The boundary line marking the base of the Pekin formation passes through the village of Covington which is shown on most maps. In travelling from Mount Gilead southeastward, one first crosses a belt of red sandstone and shale of the Pekin formation, then a rather narrow belt of the Cumnock formation in which coal is reported, but such reports could not be verified, except locally in pockets in the gray sandstone, then a belt of red sandstone and conglomerate of the Sanford formation. Continuing southeastward one then crosses the formations enumerated above in reverse order. This indicates clearly that the trough is fairly complete. and dips show that it is in the form of an open syncline. The dips on the northwest side are very slight and the width of the outcrop is correspondingly great, but on the southeast side the dips are somewhat steeper, though rather obscure, and the outcrop correspondingly narrow. It is possible that there is a small normal fault on this side of the syncline along the northwest base of Pea Ridge, but if so, it is of small displacement.

No attempt was made to follow the formations northeast of Pekin and Covington, and in fact the outcrops on the divide between the main

drainage lines are so badly obscured by sand and gravel that it is extremely doubtful whether this can be done until many drill holes have been put down to bedrock. In some places on this divide the bedrock is deeply covered, as for instance at Pinehurst, a well which was drilled for water encountered bedrock at a depth of 195 feet. The red rocks of the Newark group were seen at Jackson Springs and on the headwaters of Little River north of Pinehurst, and from these occurrences it is assumed that the synclinal structure which shows so clearly at Pekin and Covington is continuous with that at Carthage, as shown on the map accompanying this report.

CARTHAGE TROUGH

General Description.—At Carthage the east limb of the trough is lacking, having been cut off by the Jonesboro fault, as explained later, but the synclinal form is plainly apparent in the rather steeply sloping northwest side of the trough and the relatively flat bottom which is indicated by the slight dips recorded on the Carthage-Sanford road.

From Carthage northeastward the trough is continuous and of approximately the same shape and width to the vicinity of Sanford, Cumnock and Gulf, where it is nearly cut off by a cross-anticline here called the Colon anticline, which corresponds in position and direction with a line connecting Woodard's Bridge and the Sanford Waterworks on the headwaters of Lick Creek, about three miles east of Sanford. The synclinal character of this end of the trough is shown by the semicircular shape of its northern extremity. With the exception of the offset in the outcrop of the formations caused by the Deep River fault, which has already been described, the formations crop out in semicircular belts from Gulf on the northwestern side, through Cumnock to Sanford on the southeastern side. The outcrop of the Cumnock formation, as previously explained, does not complete the semicircle, as it pursues an easterly direction beyond the Capital Highway and is lost to view in a disturbance of the rocks south of Colon. But, although the Cumnock formation does not complete the semicircle, the structure is complete, as shown by dips of the overlying rocks in the vicinity of Sanford; these dips clearly indicate that the semicircular structure prevails entirely across the trough and is terminated only where it is cut off by the great Jonesboro fault which bounds the Newark rocks on the southeast. The synclinal structure about Sanford is shown by westerly and southwesterly dips for one and one-half miles west of town; by westerly dips on the Carthage road a little north of Buffalo Church; by westerly dips in cuts on the Seaboard Air Line Railway, one and one-half miles south of Sanford; by westerly dips in

cuts on the Atlantic Coast Line Railroad in the vicinity of the Lee County courthouse; by southwestward dips on the Osgood road two to two and one-half miles from town; by southwestward dips on the Poplar Springs Church road two and one-half miles east of Sanford; and by dips in the same direction just north of the Sanford Waterworks on Lick Creek nearly due east of town. The agreement of these dips and strikes indicates beyond question that the general structure in the vicinity of Sanford is synclinal and that the trough has a very symmetrical end at its northeastern extremity. Some persons may object to this conclusion on the grounds that, by the writers' own statement, the synclinal point or spoon is very much broken and disturbed by the Deep River and possibly other faults, and consequently there may be grave doubts about it ever having been a complete synclinal end. To those who may consider offering such a suggestion, it may be said that the presence of the longitudinal faults does not in any way enter into the question, for it is perfectly clear that these faults were produced after the bowing up of the Colon anticline and consequently after the formation of the spoon-shaped point to the syncline.

East of the Seaboard Air Line Railway the outcrop of the Cumnock formation trends nearly due east for one and one-half miles, and comes to an end, as far as surface indications are concerned, in a group of dikes trending N. 20° W. The original form of the outcrop between the point where it now ends on Lick Creek and the point where it reappears on Little Lick Creek probably will never be known, but it is likely that in its original form it may have turned back toward the northwest slightly and then pursued a regular northeastward course approximately parallel with the northwestern margin of the field as it is today.

Minor Structures.—The general synclinal structure of the Carthage trough is quite clear and unmistakable, but some of its subordinate structural features are extremely puzzling. The most pronounced of these minor structures is the Deep River fault which has been partly described on a previous page. This fault is easily recognized where it offsets the contact of the Pekin formation and the underlying crystalline schist and also where it causes a corresponding offset in the outcrop of the Cumnock formation in the valleys of Deep River and Buffalo Creek, but beyond these recognizable features either to the north in the crystalline schist or to the south in the interior of the Carthage trough it is probably impossible to trace it, as it simply offsets the beds within a single formation, and those lying on one side of the fault are so like those on the other side that they are indistinguishable. It is barely possible that the fault extends into the trough only a few

miles, as represented on the map, but it is more likely to extend a much greater distance, possibly to the southern boundary of the territory represented by the map. The fault is of the normal or tension type, for no other kind of fault would produce such offsets in the outcrops of the formations, as have been described here. It is the same type as that of the great Jonesboro fault which bounds the Newark rocks on the southeast and probably it was produced at the same time and by the same force that produced the larger fault. The character of the fault and its effect upon the adjacent rocks are shown in Fig. 4.

The minor structures on the rim of the Carthage trough in the vicinity of Carbonton and Haw Branch are not so well marked as the Deep River fault and consequently the exact character of the deformation is a matter of conjecture. The surface evidence of some irregularity in the structure here, as described on a previous page, consists of the bifurcation of the outcrop of the Cumnock formation a short distance west of Carbonton and the termination in a point a short distance southwest of Glendon of the northernmost of these bands of outcrop. This peculiar configuration of the outcrop, as explained on another page, can be accounted for on the assumption that there is here either a minor fold on the rim of the larger trough or that the rim is cut by a normal fault. As the stresses in the earth's crust in this region were such as to give rise to faults rather than to folds, the first assumption as to the character of the disturbance that produced this bifurcation of outcrop will not be considered further and the features showing at the surface will be attributed entirely to faulting.

The actual existence of this fault has been demonstrated for only a short distance—from Carbonton to the Carthage road south of Glendon—but in order to explain several other irregularities in the boundaries of formations, it has been hypothetically extended from near Putnam to the northern point of the syncline between Gulf and Cum-The fault attains its greatest magnitude, in this district, in the vicinity of Putnam where the displacement is probably 1,700 feet (4, Fig. 2). It appears to decrease gradually in magnitude toward the northeast, until it dies out probably before it reaches the outer margin of the Pekin formation east of Gulf. The effect of this movement on the outcrop of the various formations involved is shown graphically by a number of sections in Figure 2 which are supposed to represent the rocks as they would appear in deep trenches cut directly across the course of the fault at several places between Horseshoe Bend of Deep River and Carbonton. In considering the effect of this fault on actual mining conditions in the field it should be clearly understood that northeast of Carbonton the existence of a fault as well as its



location are almost entirely hypothetical and may or may not be correct. As this fault passes through the site of the old village of Carbonton, it will be called the Carbonton fault.

As shown in the various cross-sections of the fault, the stresses which produced it acted at right angles to the course of the fault and resulted in stretching this part of the crust of the earth. In this stretching process the stresses accumulated until they reached the elastic limit of the rocks and then a fault ensued and the movement on the fault plane (indicated by arrows) was such as to cause the rocks to occupy a wider belt than they did before the break occurred. This widening of the belt of outcrop was accomplished by the upward movement along the inclined plane of the fault of the block of the earth's crust on the southeast, with respect to the block on the northwest side of the break.

It is probable that there are faults in this field other than those shown on the map, but if so they are doubtless of a lower order of magnitude. Several small faults have been reported as having been encountered in mining, but these faults generally have a displacement of only a few feet. Faults of this magnitude are serious obstacles in mining but they are difficult to recognize at the surface. All of these faults are of the normal variety, but they do not, according to report, offset the rocks in all cases in the same direction and to the same amount. Faults that are due to the stretching of the earth's crust do not always

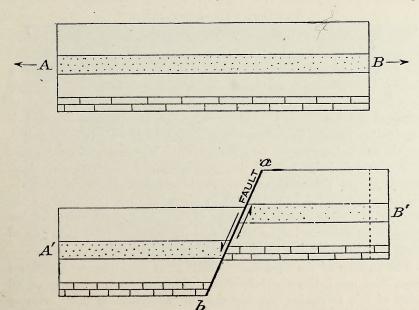


Fig. 3. Diagram showing various forms that normal fault may assume.

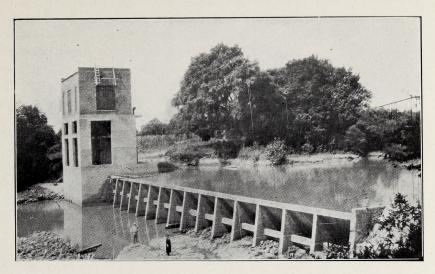
have the upraised side on the southeast; it may be on the northwest, but in that case the plane of the fault will incline in the same direction, so that when the movement is completed the rocks will occupy a greater width of outcrop than they did before. The diagram in Fig. 3 shows how faults of this type may slope in either direction, but the direction of movement will always be the same with regard to the inclination of the fault plane.

There are some slight irregularities in the coal bed shown in the Cumnock and Carolina mines. In the former the dip ranges from about 22 degrees near the outcrop to about sixteen degrees in the lowest workings which, of course, are approaching the bottom of the trough. The coal bed in the Carolina mine has not been mined far enough to reveal much regarding the structure of the coal bed, but there is one thing that stands out very prominently, and that is that the dip in the main entry is only about ten degrees. There seems to be no indication on the surface of a lighter dip of the coal bed as a dip of twenty degrees was measured in a cliff about half a mile southwest of the mine and all of the observed dips in the surrounding rocks agree with this observation. The only explanation that seems at all reasonable is that the mine has been opened in a gentle flexure in which the dip is only ten degrees, but that on driving the entries beyond this small fold, the regional dip of about twenty degrees will be encountered.

THE COLON CROSS-STRUCTURE

The fact that the Carthage trough terminates abruptly a few miles northeast of Cumnock and Sanford, as previously described, implies the presence of some sort of a cross-structure at this place, because a synclinal trough can come to an end suddenly only by being cut off by a fault or raised by a cross-anticline which effectually destroys the synclinal character. It is evident, therefore, that a cross-structure is required to explain the abrupt termination of the Carthage syncline, but the exact character of the cross-structure is a matter of some doubt. If one were to judge only by the spooning-out of the general synclinal trough toward the northeast, one would not hesitate to say that the cross-structure must be anticlinal in character, but the break in the outcrop of the Cumnock formation as well as other features of less importance, seem to indicate that faulting must at least have played some part in producing the features that we find today.

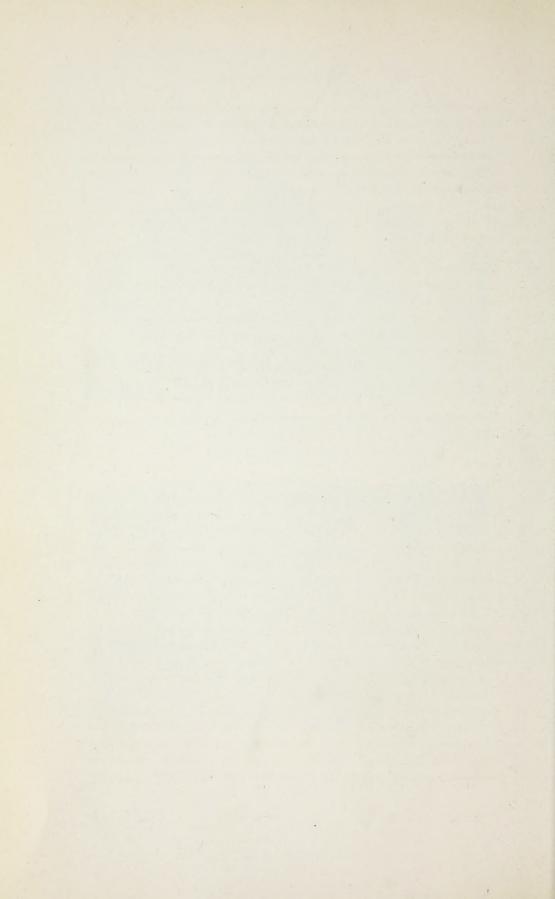
The outcrop of the Cumnock formation, as described on a previous page, does not indicate an anticline entirely across the trough, as all trace of this formation was last seen at the system of dikes crossing Lick Creek about a mile south of Colon. From Cumnock to the dikes



A. Hydro-electric plant at Carbonton. The dark shale below the dam dips slightly to the right or northwest. Camera rests on the dike shown below.



B. Dike cutting shale irregularly. The dike is exposed in the river bank near the end of the dam shown above.



mentioned above, the Cumnock formation pursues a fairly direct course and dips to the south, as it should if it formed the southwestern limit of a cross-anticline, but the absence of a nearly parallel band of outcrop a short distance to the northeast shows that the anticline is not complete, or possibly that it has been complicated by faulting. The basis for the assumption of a cross-fault is as follows:

- (1) The disappearance of the Cumnock formation when it reaches the system of dikes, shown on the map, two and three-quarter miles east of Sanford.
- (2) The curious coincidence of the trend of these dikes directly toward the sharp angle in the lower boundary of the Pekin formation, where it turns from a northwest-southeast to a northeast-southwest direction.
- (3) The discordance in the dip and strike of the rocks on the two sides of the belt of dikes, the dips on the northeast side being at right angles to those on the southwest side.
- (4) The apparent offset in the outcrop of the Cumnock formation from the point already described about one mile south of Colon to the prolongation of the belt of outcrop extending from Lockville southwestward parallel with and about one and one-half miles distant from the line marking the base of the Pekin formation.

From the statements just made it must be evident to all readers that the writers are not in possession of sufficient evidence to determine the form and character of the cross-structure at Colon, but that the evidence at hand points to an anticline that has subsequently been cut longitudinally by a fault.

The Corinth Trough.—The structure of the trough east and north of Colon, as far as the evidence obtained by the writers is concerned, is comparatively simple, consisting of a trough of syncline of folding or deposition, which later has been cut near its middle by a longitudinal normal fault. The resultant structure is that of a monoclinal block of the earth's crust in which the dips are fairly constant in amount and uniformly toward the southeast across the entire remaining part of the trough. There are some minor complications on the northwest side of the trough, in the vicinity of Deep River, but at the present time these are not well enough known to permit of an explanation.

Jonesboro Fault.—One of the most prominent structural features of the Deep River coal field is the great fault which bounds the field on the southeast side. As this fault does not, in the territory examined by the writers, pass through any town, there is some difficulty in finding an appropriate name, but as it passes through the northern outskirts of Jonesboro and is, therefore, named the Jonesboro fault. Another

reason for applying this name is that the fault is exceptionally well exposed in a cut of the Atlantic Coast Line Railroad a few hundred feet southeast of the Lee County courthouse which is located midway between Jonesboro and Sanford.

The actual contact of the Newark sandstones and the schist on the southeast side of the trough can be seen in very few places in this field, but in the railroad cut mentioned above it is as well exposed as one could expect in rocks as soft and friable as either the weathered schist or the sandstone. This contact is shown in Pl. VII. As usual in such faults, there is not a clean-cut line of contact, but the contact can be located within a very few feet. On Pl. VII the nearly horizontal red sandstone can be seen on the left, extending to about the middle of the plate where it is cut off by the fault, but, as previously stated, the break is not a clean one and some fragments of sandstone may be found to the right of this line. The right half of the plate shows crushed and contorted schist which evidently has suffered greatly when the faulting took place and in recent time as been deeply affected by the weather. This zone of crushed and weathered schist has a width of about eighty feet, but at the southern end of the cut grades into fresh schist.

The Jonesboro fault was next seen southwest of the type locality at the point where it crosses the Seaboard Air Line Railway. This occurs in a cut about 1,000 feet north of the highway bridge over the railroad on the Jonesboro-Tramway road. In the cuts at and north of the bridge the schist is so deeply weathered that it has lost its schistose character and it is quite difficult to determine the exact position of the fault, but the presence of a great mass of quartz on the west side of the track makes it certain that the schist extends at least 900 feet from the bridge. On this basis and also on the basis of red sandstone and shale a little farther north, the line was drawn as shown on the map and it is probably correct to within fifty feet.

Southwest of the place where the fault crosses the Seaboard Air Line Railway the country is deeply covered with white sand and no trace of the fault could be found for a distance of nine miles, although its supposed position was crossed at a number of places, but the sand is so deep and the dissection by the streams so slight, that no exposure of bedrock could be found. The fault was approximately located, however, on a road leading southeast from Lamms Grove Church at a distance of about one mile. Here the blanket of sand is removed for a short distance, leaving the schist quite well exposed. No red sandstone was seen, so the line as drawn on the map should be regarded only as a provisional location, and the actual position may be somewhat farther to the northwest.

The actual position of the Jonesboro fault was determined a few miles farther southwest on the Carthage-Cameron road which leaves the main Sanford road three and one-half miles southwest of Lamms Grove Church. On this road at a distance of one and one-half miles from the Sanford road the actual contact of the shale of the Newark group and the schist can be plainly seen by the side of the road. The contact here is as definite as that which has already been described in the cut of the Atlantic Coast Line Railway, north of Jonesboro.

Southwest of the Cameron road no exposures of the Jonesboro fault could be found within the limits of the territory represented by the map, although search for it was carefully made as far to the southwest as the Carthage-Vass road. The Newark rocks are exposed just west of the Carthage-Pinehurst road, but southeast of that road the sand covers everything and no bedrock could be found.

East of Jonesboro the position of the fault is much more easily determined than it was possible to do west of that place. The fault was first located east of Jonesboro near the Sanford Waterworks on the headwaters of Lick Creek. The exact contact was not seen here, but rocks associated with the schist show at the creek crossing a few hundred feet north of the waterworks and a short distance beyond the creek red sandstone of the Newark group is well exposed. This gives the position of the fault with a possible error of less than 100 feet.

East of the waterworks the trace of the fault was not crossed until it reached Poplar Springs Church. On the Sanford road leading to this church the bedrock east of the crossing of Lick Creek is greatly obscured especially on the upland by quartz gravel which is so abundant that it conceals all other kind of rock. This condition prevails to the road crossing within a few hundred feet of the church. Here the gravel is replaced by a deep red soil which at first was taken by the writers to be the residual soil left from the decay of red shale, but on close examination a small quartz vein was found in a gulley about 300 feet northeast of the church. This definitely fixes the red clay as being derived from the schist instead of from clay of the Newark group and consequently the trace of the fault must be at or somewhat to the north of the road crossing mentioned. The distance from the red clay to the fault is entirely hypothetical, but judging from the position of the fault both to the west and the east of this place, it probably is only a short distance north of the road crossing, as shown on the map.

The fault was next located approximately on a country road leading almost directly south from Ross Siding on the Norfolk Southern Railroad. The fault crosses this road about one and one-half miles

north of the main road from Jonesboro to Avent's Ferry across Cape Fear River.

The Jonesboro fault is clearly marked where it crosses the Jonesboro-Avent's Ferry road, about a mile northeast of Salem Church. The crystalline schist is here in contact with a bed of conglomerate in the Sanford formation, which contains boulders of schist up to 16 inches in diameter. The approximate position of the fault was also obtained at a point about one and one-quarter miles to the northeast of the point where it crosses the road to Avent's Ferry. At least, schist was found in place, as marked on the map; hence the fault must be to the northwest of this point.

No attempt was made to determine accurately the place where the fault crosses Cape Fear River, but its position was quite definitely fixed where it crosses the Norfolk Southern Railroad about three miles northeast of the river. Here between two cuts almost exactly one mile east of Corinth, the fault must pass, as the cut to the west discloses only a coarse boulder conglomerate, whereas the cut to the east shows only granite in place, with a distance between the cuts of scarcely 500 feet. The beds of conglomerate dip towards the fault about twenty degrees, and as southeast dips are continuous across the trough, it is supposed that the beds here exposed are about the highest beds that the writers saw in the Sanford formation. The boulders (Pl. IV-B) in the conglomerate are all granite, having been derived, in all probability from the great mass of granite to the southeast, a part of which is shown in place in the cut directly east of the fault.

The trace of the Jonesboro fault, as it is indicated on the map, is remarkably regular and without offsets or sharp bends of any kind. This apparently is different from the conception of the fault held by other writers. Thus on Kerr's¹ geologic map of North Carolina the southeastern boundary of the belt of Triassic rocks is represented as extremely irregular, making many sinuous bends that seem to have more relation to the surface configuration than they do to the geologic structure. The writers do not understand how this boundary was located by previous writers, but it was possibly drawn through points at which the red rocks were seen to pass beneath the mantle of sand. The present writers followed the same plan at first, until they discovered that the actual contact of the red rocks of the Newark group and the schist is in places several miles southeast of the point where the Newark

¹Kerr, W. C.: Report of the Geological Survey of North Carolina, vol. 1, Physical Geography, resumé, Economical Geology, Raleigh, 1875.

rocks pass under the cover of sand. After that experience the sand was regarded as entirely a surface feature and as having no relation to the real structure of the region.

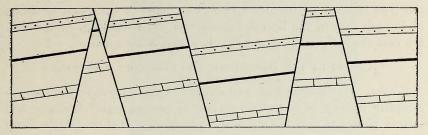


Fig. 4. Diagram showing the character of the Jonesboro fault.

The Jonesboro fault is what geologists generally call a normal fault, or a fault which has been produced by the stretching of the earth's crust in a direction at right angles to the trend of the fault trace until the stress on the rocks was more than they could stand and they are forced to break—this break is the fault. In the present case the pull came from the southeast or the northwest and it accumulated until it was strong enough to rend the rocks of the Newark group, several thousand feet in thickness and also the underlying schist to an unknown distance, but probably to as great if not a greater distance than the thickness of the Newark group. As nature abhors a vacuum, the movement of the rocks on the plane of a fault of this kind is in such a direction as will produce no open spaces within the earth's crust, but will keep the outer shell intact, even though that shell has actually a greater circumference after the faulting than it had before. The manner in which this is accomplished is shown in Fig. 4. A B represents a block of the earth's crust which is subject to tension, as indicated by the arrows at each end. The effect of this tensional stress is to stretch the rocks composing the block to their elastic limit and when that is reached there will occur a break, as the rocks can no longer withstand the pull. In block A'B', the break has occurred along the line ab and the block on the right has moved up with reference to the block on the left, or the block on the left has moved down. As the plane of the fault inclines from the perpendicular toward the right at the top and the left at the bottom it naturally follows that a movement such as is indicated by the arrows in block AB will tend to lengthen the block as the distance from A' to B' is manifestly greater than that from A to B. If the fault plane had inclined to the left at the top and the right at the bottom then movement such as has been described would have been due to compression rather than tension and the result of a break would be to shorten the earth's crust. As there is little indication of compressive stresses having been operative it is evident that the Jonesboro as well as the Deep River fault are of the type represented in Fig. 4, the fault plane in each case inclining at the top toward the upraised block, but the indications in the field are that the inclination of these fault planes is not great.

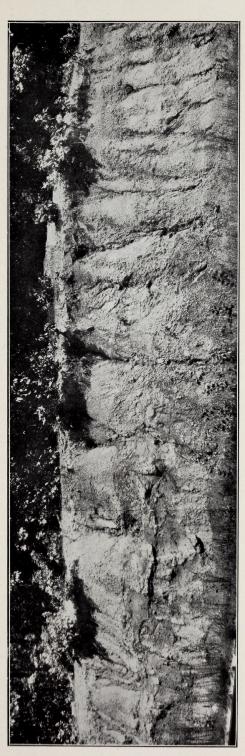
HISTORY OF THE DEVELOPMENT OF GEOLOGIC STRUCTURE

General Statement.—The writers are not prepared to outline the complete history of the development of the geologic structure, but certain phases of that history seem to be quite well shown in the Deep River Field, and others are suggested which seem to be worth stating. In departing to a certain extent from the accepted opinions regarding the manner of deposition of the Newark group and the stresses that subsequently have developed in the rocks and have deformed them, the writers are aware that they are entering a field in which other geologists have worked much more extensively and have arrived at very different conclusions, still the structural features here are such as seem to call for a different explanation. The writers merely offer the explanation that is the simplest and still at the same time the one that seems to be adequate to account for the features in question.

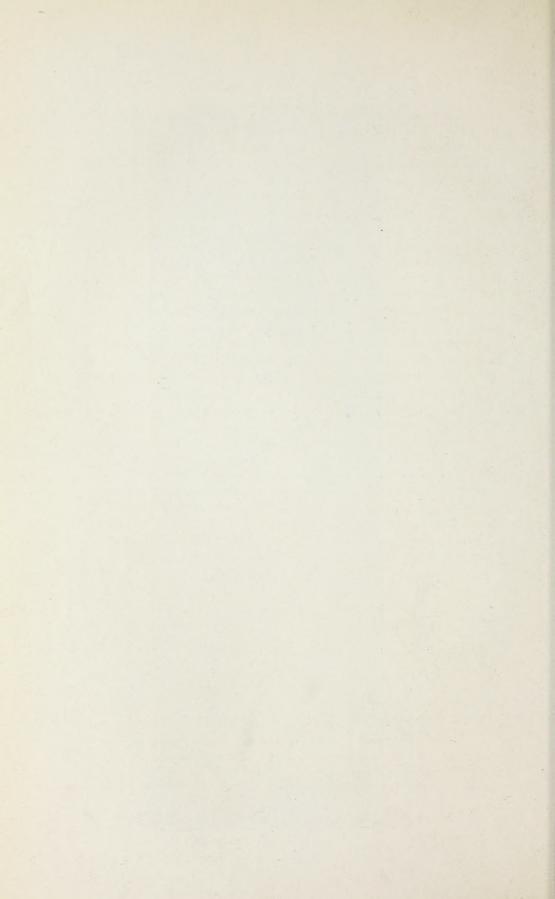
It is impossible to visualize the conditions under which the Newark materials were deposited. Many geologists have regarded the present structural features as due to subsidence during deposition, either in the form of a synclinal trough or as a tilted and faulted block. The writers are not prepared to deny that such movements have occurred, but the field relations are such that it seems absolutely certain that the formation of the Jonesboro fault was the last episode in the history of the development of the structure of this region, for the fault cuts all of the other structures; this it could not do were it not the latest feature to have been produced. If the formation of the Jonesboro fault is later than the formation of the other features, it is obvious that it cannot have influenced in any way the erosion of the adjacent region and the transportation of the coarse material to the scene of deposition in the Newark trough.

According to the data accumulated during the study of the Deep River Coal Field, the development of the present structural features may be divided roughly into three separate and distinctive episodes, as follows:

(1) Deformation accompanying sedimentation.—Geologists who have studied the Newark group in the Appalachian region generally believe



Jonesboro fault in railroad cut. This exposure is in a cut of the Atlantic Coast Line near the Lee County Courthouse. The fault brings red sandstone of the Sanford formation on the left in contact with badly decomposed and contorted schist on the right.



that these formations were deposited on a subsiding surface and that as time progressed the subsidence became more and more pronounced and at the same time the land surface on either side was elevated more and more, enabling erosion to furnish not only more material to be deposited, but much coarser material, consisting generally of boulders several feet in diameter. Authorities are divided in their opinions, some holding that the subsidence took the form of a syncline of deposition, and some that the subsidence was due to the dropping or the tilting of blocks of the earth's crust which had been separated from one another by great faults.

The writers believe that similar movements accompanied the deposition of the various formations constituting the Newark group in the Deep River Field, but the problem is whether the subsidence was of the nature of a syncline or of tilted and depressed blocks. If it were the latter then some trace of the faults which accompanied and made possible the tilting of the blocks should be found. The only fault that has affected the trough throughout its entire extent is the Jonesboro fault, but it has been shown that this fault truncates some of the important structures of the field and consequently it must have occurred long after the rocks were laid down and after they were deformed in certain ways. In the light of this evidence the writers have concluded that faulting did not play an important part in the original deepening of the troughs. Even with this point settled there is still considerable uncertainty in the minds of the writers as to whether the troughs are the result of simple downward pressure or whether they are the result of horizontal compression. As there is little if any evidence concerning this phase of the subject, it will be dismissed as one of those questions which at the present time are unanswerable.

(2) Torsional stresses resulting in cross-structures.—The next episode of a structural character that followed the close of sedimentation in this trough was a movement that produced the cross-structures that are observable today. The most pronounced structure of this character is the Colon cross-anticline which seemingly is responsible for the northeast spoon-shaped termination of the Carthage trough. As explained before, synclinal structure is visible from the northwest side of the trough at Carbonton to the Jonesboro fault south of Sanford. It is inconceivable that a syncline of deposition could have such a symmetrical end, unless it terminated the area of deposition, but here it occurs near the middle of the length of the original trough, without leaving any evidence that could be interpreted as indicating a difference in the character or amount of material deposited in one part of the trough from that deposited in another.

With the cross-structures must be classed also the dikes of the region which in general trend north twenty degrees west. Along most of the dikes there is no indication of movement in the adjacent rocks, except such slight disturbances as have already been described under the heading Igneous Rocks. Although there is little evidence of movement on the planes of the dikes, the great regularity of their trend and their close parallelism in certain zones indicate that there has been some controlling condition that determined their direction. can suggest no such controlling condition, unless it be incipient fissures which the dikes have followed. If the presence of such fissures before the intrusion of the igneous material be granted, then the origin of the fissures remains to be explained. The only suggestion is that possibly they were the result of torsional stresses which twisted this part of the earth's crust and produced the incipient openings that later were filled with the molten material forming the dikes. It is impossible to fix the relative date of the igneous intrusions, except that they may possibly have occurred simultaneously with the production of the Colon cross-anticline and before the movement began that resulted in the Jonesboro fault.

It seems highly probable that the Colon cross-anticline and the system of fissures which were followed by the dikes are both the result of torsional stresses which resulted from the crowding to the westward of the north end of the trough holding the Newark rocks. This twisting motion resulted in the formation of the incipient cracks followed by the dikes, a buckling of the northwestern rim of the trough, which produced the Colon cross-anticline that is nothing more than a cross wrinkle caused by the westward movement of the northern part of the trough, and possibly the faulting of this anticline which resulted from the same movement.

In the buckling movement just described and the formation of incipient cracks, a line of weakness was formed across the trough passing through the present site of Colon and Woodard's Bridge and as the rocks to the north were crowded westward it seems altogether reasonable to suppose that a fault occurred along this line, allowing the rocks on the north to move to the westward as compared with the rocks on the south of the fault. The amount of this westward movement is measured by the offset of the formation and this probably amounts to about two and one-half miles.

(3) Normal faulting in a longitudinal direction.—The last episode in this succession of events was the development of the Jonesboro, Deep River, Carbonton and all other faults of the normal type that

may be found cutting the Newark rocks in a direction roughly parallel with the trend of the troughs.

The Jonesboro is the best example of this type of fault as it extends throughout the territory represented by the map and is the most pronounced displacement that is known in the region. So far as can be determined from the few exposures at which this fault has been seen, it is a nearly vertical break which allowed the rocks on the southeast side to move upward with reference to those on the northwest side, or the rocks on the northwest side to move downward with reference to those on the southeast side. This movement is evident when one considers the results produced by it. All the evidence in the field goes to show that the trough in which the sediments of Triassic age were deposited was once much wider than it is at the present time. Before erosion had removed the rocks they doubtless extended farther to the northwest and it is certain that the Jonesboro fault has cut a strip of unknown width off the southeast side, for the offset in the Carthage and the Corinth basins is not reflected in the course of the fault as it should be if the fault were a normal boundary, and the structures developed in the Carthage trough ran squarely against the fault at right angles which they would not do were the fault at the original margin of the trough of deposition. In view of these facts we must conclude that previous to the faulting the troughs were wider than they are at the present time and that the part to the southeast of the fault has been lifted high above the other part and has been eroded long ago, so that now no trace of it remains; or the trough on the northwest side has been depressed several thousand feet and normal erosion has removed the remnant of the Newark rocks on the southeast side. Either movement would have produced the same result, namely, that the schist on the southeast side is brought into contact with the highest beds of the Sanford formation. The amount of displacement of the formations cannot be told accurately, but it must at least have been sufficient to bring all of the Newark rocks above the present surface on the southeast side of the fault and possibly a considerable thickness of schist hence the movement on the fault plane must have been not less than the thickness of the Newark group which on a previous page has been estimated at 7,000 or 8,000 feet.

The character of the fault and the movement which has taken place on the fault plane is illustrated in Fig. 4. Such a break as that here illustrated, if it took place suddenly, might have produced a ridge on the southeast side of the fault of mountainous proportions. Geologists are now generally agreed, however, that all such movements have been very slow, in fact so slow that, had man been upon the globe at that time, he might not have been aware that great crustal movements were in progress, as the only disturbance he may have felt was an occasional earthquake shock of not very great intensity. If the faulting took place as slowly as indicated above, it is probable that the action of streams and the weather wore down the surface of the uprising mass as fast or even faster than it moved, and consequently no mountains were produced, although the aggregate displacement, due to the faulting, is many thousands of feet.

THE COAL

THICKNESS OF THE COAL BEDS

In the present examination of the Deep River Field very little coal was seen. A great amount of prospecting and even mining was done in the early days but the old prospect pits and the mines have generally fallen shut, so that the coal is not visible at the present time. Here and there on the public roads or in gullies in the fields, some coal may be seen, but generally not enough to enable one to pass judgment as to its quality or workability.

The Cumnock mine, being the most extensive operation in the field, naturally presents the best opportunity to study the character and thickness of the coal beds. In the section of the Egypt shaft, published by Captain Wilkes¹ in 1858, the thickness of the coal beds is given as follows:

SECTION OF COAL BEDS IN THE EGYPT SHAFT

				Ft.	In.
Coal				4	0
Blackband .				1	4
Coal				1	1
Shale					6
Coal	12050				7
Shale, black and	iron	balls		8	0
Sandstone, gray	and c	lay		16	0
Blackband .				1	5
Coal				1	0

In the early days, it is believed that the entire thickness of the Cumnock or upper coal bed amounting, in this section, to seven feet six inches, was mined. Whether or not the blackband (carbonate of iron) was utilized in the manufacture of iron, the writers have not been able to determine, but it seems possible that the builders of the old Endor furnace had in mind, when they chose this location, not only the nearness to a supply of fuel, but also of a moderate supply of low

¹Report of the examination of the Deep River district, North Carolina. Repot of the Secretary of the Navy, 35th Congress, 2d Session, Senate Doc. 36, 1858.

grade ore from the Egypt and other mines of the district. Even if the ore were tried in this furnace it must have soon been discovered that it was not suitable for the manufacture of iron as it is associated with and probably largely impregnated with phosphate of iron which occurs in nodules in the associated shale.

The bad reputation which this coal had in the early days is probably due to the fact that both benches of the coal were mined and it is equally probable that some of the tests which are reported to have resulted disastrously were made on coal from the lower bench, as this coal, as shown in the table of analyses, has an ash content of 30 or more per cent.

The present writers measured the coal bed in a room in the Cumnock mine directly above Slope No. 1; at one place it has a thickness of three feet five inches and at another, three feet seven inches. These measurements are of the entire upper bench, including at the bottom some coal which is more bony than that which overlies it. Mr. J. J. Forbes, of the U. S. Bureau of Mines, gives the following as the type section of the two benches of coal in the Cumnock mine:

TYPE SECTION OF THE COAL BED IN THE CUMNOCK MINE

	(J.	J. Forbes)		
				Ft.	In.
Coal				. 3	31/2
Bone					3
Blackband .			J	. 1	6
Coal					10
Bone					2
Coal					4
Bone				1.0	3
Coal with thin	layers of	shale .		. 1	0
				-	
Total be	d			. 7	$7\frac{1}{2}$
Total co	oal .			. 5	$5\frac{1}{2}$

In cutting the samples of coal in this mine for analysis, Mr. Forbess measured the following section of the upper bench of the coal bed (see Fig. 5): Coal 3 feet (analysis No. 85446), underlain by 4½ inches of bone, in room 1, off No. 1 rise; coal 3 feet 3½ inches (analysis No. 85447) underlain by 3 inches of bone, in room 10, off right side of No. 1 slope; coal 3 feet 7½ inches (analysis No. 85448), underlain by 2¼ inches of bone, in room 13, off No. 1 slope; coal 3 feet 7¾ inches (analysis No. 85449), underlain by 1 inch of bone, in room 8, off No. 1 slope.

¹Unpublished report by the Bureau of Mines to Col. Joseph Hyde Pratt, State Geologist.

DRILL HOLE NO. 2

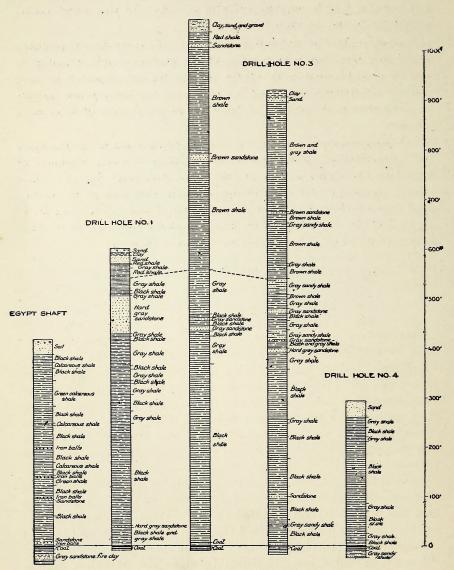


Fig. 5. Section of coal beds.

In the mine of the Carolina Coal Company the upper bench of the Cumnock coal bed, according to one measurement made by the senior writer at the face of 1 left entry, 75 feet from the foot of the slope, is 3 feet 4 inches thick. In sampling this bed for analysis 1 inch of coal at the top was inadvertently excluded from the sample. The analysis of the remaining 3 feet 3 inches of coal is shown as analysis No. 83960 in the table on p. 96. Mr. J. J. Forbes, of the Bureau of Mines, also obtained samples in this mine and his measurements at the points sampled are as follows (Fig. 5): coal 3 feet (analysis No. 85590), on 1 rib of left air-course, 700 feet from the mouth of the mine; coal 3 feet (analysis No. 85591), in No. 1 cross-entry, in by slope air-course. Mr. Forbes also took samples for analysis and made measurements of the lower bench of the coal bed in the Carolina mine as follows:

SECTIONS OF LOWER BENCH OF COAL IN CAROLINA MINE

A		В		
	Ft. In.		Ft.	In.
Coal ¹	. 10	Coal ²		10
Bone	. 1	Bone		1
Coal ¹	6.	Coal2	idita et l'age	11
Bone	3			,
Coal ¹	1 . 1		1	10
	2 9			

Sections A and B were measured in 1 left entry, off main slope.

In 1884 H. M. Chance prospected the coal beds in the vicinity of Farmville (the Carolina coal mine) quite thoroughly, sinking in all twenty-two shafts in order to determine the character and thickness of workable beds. In one of these shafts he found the upper bench of the Cumnock coal bed to have a thickness of 3 feet, but in all others it was very much thinner or wanting altogether. His final decision was that the upper bench of this coal bed—the one now being mined on the property by the Carolina Coal Company—is of no value. The conditions which led to this decision were probably due to the fact that the many prospectors who had preceded Chance in this part of the field, had mined out most of the coal along the crop and what remained had been affected by caving or the metamorphosing action of dikes and consequently did not show the full thickness of the bed.

Finding, as he supposed, that the Cumnock bed was here worthless, Chance directed his attention to the Gulf coal bed which lies about 30 feet below the Cumnock bed. His section of these beds and the intervening measures is as follows:

¹Sampled for analysis No. 85593. ²Sampled for analysis No. 85594.

SECTION OF COAL BEDS AT FARMVILLE

BY H. M. CHANCE

	Feet	In.
Coal Cumnock bed	1	0
Shale and blackband	 1	6
Clay and shale (estimated)	 10	0
Shale	5	0
Coal		4
Shale and clay	 6	0
Coal	 1	0
Shale and clay	4	0
Coal	 1	2
Shale and clay	3	6
Coal, shaly Gulf bed .		8
Coal	2	0
Shale in blocks		4
Clay	 4	0

Chance concluded that the Gulf coal bed is more regular in thickness and consequently more reliable than the Cumnock bed and hence he concentrated his operations on this bed and mined more than 100 tons which were shipped to Raleigh for the use of the Raleigh State Exposition. The character of this coal is shown by an analysis which is supposed to be of a sample representing about 60 tons of coal from the Gulf bed. The analysis is as follows: moisture, 2.1; volatile matter, 28.9; fixed carbon, 52.6; sulphur, 3.7; and ash, 12.7. It is easy now, with the data at present available, to understand that Chance was entirely mistaken in the relative values of the Cumnock and Gulf coal beds, both as regards thickness of beds and quality of the coal.

In addition to the information which the Cumnock and the Carolina mines afford regarding the coal beds there are the logs of four deep drill-holes which have been put down on the Cumnock property. These sections are shown in Fig. 1. The coal beds penetrated by the drill are as follows (Fig. 5):

SECTIONS OF COAL BEDS IN DRILL-HOLES ON CUMNOCK PROPERTY

Boreho	le No.	1			Ft.	In.	Borehole No.	2		Ft.	In.
Coal		,			3	10	Coal .			3	11
Bone						4	Blackband				9
Black	band				2	3	Coal .		0.5	1	3
Coal				1.	1	2	Blackband		1000	1	1
	Coal				5	0	Coal .				7
	Bed		1 5.		7	7	Coal			5	9
							Bed	-		7	7

Borehole No. 3		Ft.	In.	Borehole No. 4	Ft.	In.
Coal		2	2	Coal and coke	4	0
Shale, sandy		0	6	Blackband .	 1	4
Shale, black		0	6	Coal	 2	0
Coal, bony .			4			
Blackband .			10			
Coal		1	6			
Shale, black			6			
Coal, bony .			3	Coal .	6	0
Coal .		4	3	Bed .	7	4
Bed .		6	7			

It must be admitted that different measurements obtained on the upper bench of the Cumnock bed in the boreholes might be interpreted as confirming Chance's opinion that this bed is too irregular in thickness to be successfully mined, but when all of the data on thickness available at Cumnock and the Carolina mines are considered, then one cannot help being impressed with the apparent regularity of the upper bench, running on the average about 3 feet 3 inches in thickness and that those sections which depart from this assumed normal section are distinctly different and possibly are to be explained by the disturbing influence of dikes. Usually the cores obtained in drilling are regarded as the final word regarding coal beds, but in this field the core may be seriously affected by a dike and hence every such record needs interpretation by a competent geologist.

On the outcrop southwest of Cumnock there are a few exposures of the coal beds where measurements can be obtained and a number of caved prospects regarding which there was obtained some information that is considered reliable. Some few years ago a slope was sunk on the principal coal bed from a point on the outcrop about $1\frac{1}{2}$ miles nearly due west of the Cumnock mine by William Hill, then General Manager of the Cumnock property. According to Mr. Hill the slope was carried down in coal 4 feet 2 inches thick to a point 150 feet from the mouth of the slope at which the coal bed is offset by a fault. After considerable money had been spent in a fruitless search for the coal bed, the project was abandoned.

In the vicinity of Gulf many prospect pits and so-called mines have been opened on the Cumnock coal bed, but these have not been kept open and the result is that the pits have caved to such an extent that the coal cannot be seen. The only place at which coal is exposed at the present time in this locality is in a recent cut (Pl. II-B) of the Norfolk Southern Railroad, about 2,000 feet southwest of the railroad station at Gulf. The coal bed here is badly crushed and weathered, but it has the appearance of being about 4 feet thick.

Chance gives some data regarding the coal beds at Gulf. At the time of his examination (1884) the remains of two old slopes were found near the boundary line between the Taylor and the Gulf properties from which apparently considerable coal had been mined. slope on the Taylor farm was not open so that the coal could be seen, so Chance sunk a shaft nearby which struck the upper bench of the Cumnock bed below water level. In this shaft the coal bed measures "almost exactly 3 feet of good clean coal with a slate roof and blackband floor." The analysis of an "average sample" taken from a ton of mined coal, as reported by the State Chemist, is as follows: moisture, 1.7; volatile matter, 35.4; fixed carbon, 55.4; sulphur, 2.0; and ash, 5.5. This analysis is almost identical with some given on page 108 of samples from the upper bench of coal in the Cumnock mine, except that the percentage of ash is less than that shown in recent sampling. This small percentage of ash is probably due to the fact that the sample was picked coal, although intended to be of average quality.

The coal bed opened on the eastern edge of the Gulf property, as reported by Mr. Williams, has the following average section:

SECTION OF COAL BED ON GULF PROPERTY

				Ft.	In.	Ft.	In.
Coal				2	0	to 2	6
Shale					4	to	6
Coal	 	1.5	14.13		5	to	6

A sample of coal from this bed, taken from a pile of about 400 tons gave the following analysis: moisture, 1.9; volatile matter, 32.8; fixed carbon, 59.9; sulphur, 1.4; and ash, 4.0. Chance, however, believes that this analysis is not representative and that the coal contains much more ash and sulphur than the analysis indicates. This bed is correlated by Chance with the bed which he mined at Farmville and which lies about 30 feet below the Cumnock bed. As the coal appears to be quite well developed here it will be called the Gulf coal bed.

From the vicinity of Gulf to the old Black Diamond mine on Indian Creek, there is apparently little information regarding the condition of the coal beds at the crop line or indeed back from the outcrop, as no records of diamond drill-holes have been obtained.

The most recent report on this part of the field is that of Chance (p. 43) which is as follows:

Explorations made in the past upon the western part of the Gulf property near the Tyson place evidently failed to find the coal in good condition. Two or three slopes were sunk here at which considerable work was evidently done, but the reports not being favorable and the appearance of the openings and the dumps being extremely unfavorable, I did not consider it necessary to reopen these pits, especially, as much work has recently been done on this property by northern capitalists, and as they did not open at these places the inference that the prospect was not favorable enough to justify further work received additional and forcible support. Moreover as the property is now being thoroughly prospected by the present owners (Metropolitan Bank of Boston), with a diamond drill, at a cost of probably three or four times as much as was appropriated for this exploration of both the Deep and Dan river coal fields, the results so obtained will doubtless determine the value of this property independently of any work that might be done by that State.

Explorations on the Tyson and Palmer places had also evidently failed to disclose the existence of coal of workable quality and thickness, if we may place any faith in the recollections of the residents (and in this I think we may), and as the opening made on the Evans place at the old workings, were of such a discouraging character, I did not feel justified in making any opening on these intermediate plantations, i.e., between the Gulf property and the Evans place.

It is very unfortunate that the results of drilling operations in the vicinity of Gulf, and from that place southwestward to the old Black Diamond mine have never been made public. Under ordinary conditions Chance's conclusions regarding the character of the coal bed would be entirely justifiable, but, owing to the apparently abnormal conditions in this field, the writers are not fully satisfied that, because, one man or one group of men, not thoroughly acquainted with the geologic conditions of the field, saw fit to advise no further operations in 1885, that the field is entirely without merit in 1923. We do not think it entirely safe to come to such a conclusion without more evidence, and consequently the condition of the coal bed in this part of the trough will remain unknown until core-drilling is done here or in adjacent areas.

The Cumnock coal bed has been mined quite extensively near the point where the wagon road from Gulf to Carbonton crosses Indian Creek. This mine is known as the Black Diamond mine, but by whom it was developed and operated the writers do not know. It was evidently in operation many years ago as the old openings have largely fallen shut and the mine dump has been almost completely covered by a rank forest growth. No satisfactory measurement of the thickness of the coal bed could be made, but Chance, in 1884, made some reëxcavations here which throws some light on the condition of the coal bed. At the old shaft Chance reports the following section:

SECTION OF COAL BED IN THE SHAFT OF THE BLACK DIAMOND MINE

			Ft.	In.
Shale, clay, and decomposed shale .	4.4	de en A	. 32	4
Coal, with some shale				6
Shale and blackband			1	6
Coal			. 2	8

Chance makes the following comment:

In the airway I found the workings were also upon the lower bench, but the coal was not quite so thick here as at the shaft near the old slope. The coal appeared to be somewhat variable and it was difficult to select a place to make a measurement. The coal may be considered to average as follows:

			Ft.	In. $Ft.$	In.
Shale and coal				6 to	10
Coal .			1	8 to 2	0

Part of the coal is poor and slaty and, if the measurement included only the good coal, the figures would be much smaller. The whole bed, therefore, may be considered as showing an average measurement:

	Ft.	In.	Ft.	In.
Coal (bench not worked)	1	2 to	1	6
Shale and blackband	1	6 to	1	6
Shale with some coal		6 to		10
Coal (lower bench) .	1	6 to	2	0

This bed is doubtless identical with the "Big" bed at the Gulf, Egypt, and Farmville, but in a sadly deteriorated condition. The upper bench, which at these localities carries the best coal, is here too thin to be worked, and the low bench is not only thin but of poor quality, yielding very little good coal.

Chance's condemnation of the coal bed at this mine is based largely on a question of thickness of the coal bed. The question now arises, was he justified in his conclusions? The coal in the shaft of this old mine is a high-rank anthracite, as shown by samples collected by him and analyzed by the State chemist. The analysis is as follows:

ANALYSIS OF COAL FROM THE BLACK DIAMOND MINE

						Per cent
Water at 115 C.						4.3
Volatile matter		The state of			•	4.9
Fixed carbon						74.6
Sulphur	•					2.1
Ash						14.1

As the coal in this field is generally of a bituminous character, it is evident that the anthracite, disclosed by this analysis, is due to local metamorphism by the heat of a dike which cuts the coal bed practically at the point where the old mine was situated. This inference was verified by the writers who found many blocks of excellent anthracite on the mine dump and the dike itself is visible on the surface

all about the old workings. If, therefore, the coal bed, after being converted into anthracite has a thickness of 1 foot 2 inches to 2 feet, as quoted above, is it not reasonable to assume that the coal bed, before it was metamorphosed by the dike was considerably thicker? If this is a reasonable assumption, can these measurements, which are the only ones available, be used to predict the thickness of the bed at some distance from the dike or in the interior of the trough? Fortunately there is considerable data at hand bearing on the shrinkage of a coal bed when it is converted from bituminous coal to anthracite, and the writers believe that the data are in such concrete form that they may be applied directly to this case.

In the Cerrillos coal field of New Mexico, a coal normally of bituminous rank has been locally converted into high-rank anthracite by the heat of a volcanic sill which has been injected into the rocks a few feet above the coal bed. Where the coal has been converted into anthracite it has shrunken from 4 feet 6 inches to 2 feet 10 inches in thickness. A similar case is known in Routt County, Colorado, where a volcanic sill has changed a bituminous coal 11 feet thick into anthracite 6 feet 6 inches thick. The percentage of reduction in thickness in these two cases is nearly the same, but to apply the results to the coal of the Deep River Field it is necessary to know the percentage of increase from anthracite to bituminous. In the New Mexico coal it amounts to 60 per cent and in the Colorado coal to 69 per cent. The average of these two is 65 per cent.

If this rate of increase is applied to the measurements given by Chance, his figures would be changed as follows:

- 1 foot 6 inches multiplied by 1.65=2 feet 5\% inches.
- 2 feet multiplied by 1.65=3 feet 31/2 inches.
- 2 feet 8 inches multiplied by 1.65=4 feet 4\% inches.

On this basis it seems quite probable that away from the dikes the coal in the Carbonton region will be found thick enough to work, at least in the vicinity of the outcrop. What its thickness may be in the interior of the trough can be told only by deep drilling.

The next point at which some information was obtained regarding the coal is an old prospect or mine, generally known as the Gardner mine. This prospect is in a ravine on the southeast side of the road leading from Carbonton to Horseshoe Bend of Deep River and about 2½ miles from the railroad station at Carbonton. Here again the prospect has been opened where the coal bed is cut by a dike and the heat has changed the coal into anthracite. An analysis by the State chemist of a sample of the best coal from this prospect, collected by Chance (p. 40), is as follows:

ANALYSIS OF COAL FROM THE GARDNER MINE

		1	Per Cent	ţ
Water at 115 degrees C.	7.	- 1	1.7	
Volatile matter			6.4	
Fixed carbon			80.0	
Sulphur			2.8	
Ash		· ·	9.1	

The old prospect is still open, exposing the coal bed which, according to the writers' measurements, is as follows:

SECTION OF COAL BED IN THE GARDNER MINE

		· Alexander	Ft.	In.
Coal	A 100 15			111/2
Shale,		or and the feet to		4
Coal			1	3
			- 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1
			2	61/2

As the analysis, quoted above, shows this to be a good grade of anthracite, the thickness should be increased as follows:

CORRECTED SECTION OF THE COAL BED IN THE GARDNER MINE

					Ft.	In.
Coal					1	7
Shale, black	950			113	3 74 74	4
Coal		The state of the	Director.		2	03/4
						1
					4	134

The section of the coal bed in this mine, as reported by Chance, is different from that measured by the writers. Chance's statement (p. 47) is as follows:

The total thickness of the bed, as exposed by this drift, is about 2 feet 8 inches [4 feet 4¾ inches, expanded measurement] with a few inches of very slaty coal on top and two (sometimes three) slate partings from ¼ inch to 1 inch thick dividing the coal into benches of very nearly equal size. The lower part of the bed is evidently high in ash; the coal between the slate partings is clean and good, there being two such layers respectively 5 and 7 inches thick

There are many old prospects on the northwestern line of the coal outcrop from the vicinity of Haw Branch village southwestward for a distance of two miles, but no new data on the condition of the coal bed in this part of the field was obtained by the writers. Chance states that he opened some of these old pits on the Murchison farm, probably a short distance west of Haw Branch station. Here he found 6 to 8 inches of "slaty worthless coal" overlying 26 to 30 inches of "coal with several thin slaty seams." Judging from the analysis given by Chance, it is apparent that the coal here has been only slightly

metamorphosed to a semibituminous coal. In the pits on the southwest side of Deep River, on what is now the Jones farm, he reports the coal bed as containing more shale than coal and in general a worthless bed.

Although it seems possible that the coal may be successfully mined as far to the southwest as the Gardner mine, the evidence seems to be conclusive that the bed is deteriorating in this direction and that somewhere near the place where it crosses Deep River is the limit of workable coal. There are many rumors of coal farther to the southwest, but the writers were unable to verify them and they very much doubt the presence of coal thick enough to work in the territory drained by McLennon's Creek.

East of the Deep River fault, but little is known of the coal. Pretty Creek just north of the old McIver homestead, coal was mined rather extensively about Civil War times, but the mines have slumped shut and at present no coal can be seen. According to report, Charles Reeves reopened some of these mines a few years ago and found a coal bed 2 feet thick. As there are no dikes known in the vicinity, it is probable that the thickness reported by Mr. Reeves is the maximum thickness than can be expected in this region. An ambitious attempt was made just before the Civil War to develop the coal east of this fault, by a two-compartment shaft, located nearly a mile due west of the point where the Old Cumnock road branches off the Capital Highway, 23/4 miles north of Sanford. There is a vague report current that this shaft is 400 feet deep, but it is now full of water and that rumor could not be verified. No trace of coal or even black shale was found on the dump so it seems probable that the project, which was abandoned on the breaking out of hostilities, had not been carried to completion and a workable bed discovered. It seems incredible that any company would expend money enough to sink such a shaft without preliminary drilling to establish the presence of a workable bed of coal, but the writers could not find any one who knew of such drilling having been done or even were aware of the names of the parties who sunk the shaft.

Professor Emmons, as stated on another page, reports that a 10-inch bed of coal was pentrated by the drill at a shallow depth on the farm of Martin Dyer, near the junction of the old Cumnock road with the Capital Highway. So far as known to the writers this constitutes all of the data on the coal west of the Capital Highway. It is manifestly inadequate as a basis for a prediction as to the tonnage available and the extent of the field, but it is given in detail so as to show clearly how meager the information is and how necessary, before new mining

enterprises are inaugurated, to drill back of the outcrop so as to know definitely the thickness and character of the coal beds and their depth below the surface of the ground.

East of the Capital Highway and as far northeastward at least as Haw River no coal more than 3 inches in thickness has been reported on what is regarded as reliable authority. In view of this fact it is highly probable that coal of workable thickness does not occur in this region.

EXTENT OF WORKABLE COAL AND THE AVAILABLE TONNAGE

From the evidence just given regarding the conditions of the coal beds on the outcrop and in mines and drill-holes, there seems to be little question that one bed, at least, is of workable thickness along the outcrop from the Deep River fault to Haw Branch, a distance of 11 miles. East of the Deep River fault the evidence is so meager regarding the presence of workable coal that one does not seem justified in including any of this territory in a probable coal field, until the presence of such coal has been demonstrated by extensive prospecting with pick and shovel or better, with a core drill.

The amount of available coal in this field depends upon several factors, some of which are known with some degree of certainty and others are unknown or are so little known that any statement regarding them must partake more or less of the character of a guess. One of the greatest of the unknown factors is the shape and depth of the trough holding the Newark rocks. Some have assumed, but on what grounds the writers have never found out, that the basin at Cumnock is nearly circular in shape and some manuscript maps are extant on which the circular outlines are represented and even the center of the basin indicated. As stated under the heading Geologic Structure, the writers considered themselves fairly successful in determining the shape and depth of the Carthage trough. Fortunately for those wishing to develop coal mines, this trough seems to be comparatively shallow and with a nearly flat bottom. This means that the coal beds, as well as the associated rocks are but slightly disturbed by folds and faults and consequently that mining conditions, even at a depth are fairly good. The shallowness of the trough also means that much more of the coal is accessible than would be the case were the dips steep and regular from the rim to the axial line and consequently much more of the coal is within mining distance of the surface than otherwise would be the case.

The questions which the operator or the prospective operator wishes to have answered are these:

(1) How deep can successful mining be carried? (2) How far will one have to go from the outcrop to reach this depth? (3) Does the coal bed hold a workable thickness as far as it is within mining distance of the surface?

The first is an engineering question and can be answered better by a mining engineer of experience than by a geologist. Nevertheless certain things are apparent in the mines already in operation which may throw some light on the possibility of conducting deeper operations farther within the trough. In the first place the black band forming the parting between the two benches of the coal bed in the Cumnock mine makes an excellent floor that will not heave under pressure from the pillars. Also the roof is excellent, doubtless being able, when properly supported to withstand the load of many hundreds if not thousands of feet of strata. The question of the depth to which mining can be carried in this trough is largely one of cost; it seems probable, however, that mining can be carried to a depth of 2,000 feet, without great difficulty. The writers have based their conclusions largely upon this assumption. If it proves to be erroneous, some reduction will have to be made in the estimated tonnage of coal available.

The determination of the location of the points at which the coal reaches a depth of 2,000 feet is based largely upon cross-sections made up from observed dips along the line of the section. As surface observations on the dip of the beds are not entirely reliable, owing to the lack of distinctive bedding planes in the more massive rocks and to the disturbed condition of the rocks in the presence of dikes, the determination of the true dip is very difficult indeed. Cross-sections constructed under such conditions must be regarded as provisional only and to be replaced as soon as more reliable data are available.

Another factor that must be taken into account in determining the extent of workable coal within the trough is the probability that the coal bed thins southeastward in conformity with the thinning noticed on the outcrop. Judging by the facts at present available, one is justified in the conclusion that the coal bed does not retain a workable thickness to the southeast beyond the old prospects near the McIver homestead, east of the Deep River fault. He is also justified in assuming that the bed is not workable much beyond Haw Branch. Of course no one knows whether the line marking the limit of workability in the interior of the trough is straight between these two points, or whether it pursues a circuitous course. In the absence of evidence to the contrary, it is reasonable to assume the simpler condition rather than a more complicated one, therefore, one is justified in assuming that this line is nearly straight between the points specified above, and the conclusions arrived at by the writers are based accordingly.

An estimate of the tonnage of coal available, based on such data is of course very inaccurate, but it has a certain value, as being under present conditions, the best guess that can be made, but it should be remembered that it is only a guess. In making this guess or estimate, great reliance was placed on the section along the Sanford-Cumnock road for a distance of about three miles from the village of Cumnock. On this section the writers had as a basis the data from the Cumnock mine, which shows the coal at a depth of about 600 feet below the surface, and the log of drill-hole No. 3, which recorded the bed at a depth of a little more than 900 feet below the surface. From borehole No. 3 southward the section was based solely upon dips measured at the surface, and as these are generally slight and directed to various points of the compass, the coal bed descends very slowly toward the south and it is estimated that at a distance of $3\frac{1}{2}$ miles from the outcrop, it is only about 2,000 feet below the surface.

Similar sections have been constructed from the south end of this section to Gulf and to Carbonton, and the sections have been made to harmonize at their common meeting point. The points on these sections at which the coal is estimated to be at a depth of 2,000 feet have been connected on the map by the line Y Z, but in using this line it should be remembered that its position is only vaguely determined and that in reality its place may be changed considerably when deep drilling has been done. In the meantime this line is intended to mark the lower limit of workable coal as indicated by all of the evidence available at the present time.

All territory lying between the line Y Z and the outcrop of the coal bed and extending from the Deep River fault to the Gardner mine near Haw Branch is regarded provisionally as coal territory, in which the coal is accessible, providing mining can be carried to a depth of 2,000 feet. The area included within the lines mentioned above is about 25 square miles, and it seems reasonable to assume that the coal bed throughout this territory averages at least 3 feet in thickness of recoverable coal. The weight of coal necessarily depends upon its specific gravity, and it is assumed that the Deep River coal has a specific gravity of about 1.3. This is an assumed figure, as no specific gravity determinations of the coal, as far as the writers are aware, have been made, but it is based on many determinations of the specific gravity of various coals of the country. As the weight of a cubic foot of water weighs 62.5 pounds, and the weight of coal is 1.3 times that of water, it follows that the weight of a cubic foot of coal, as it lies in the ground, is 62.5 by 1.3 = 81.25 pounds. The number of cubic

feet in a coal bed 1 foot thick and one acre in extent is 208.7 by 208.7 by 1=43,556 cubic feet, and as the weight of one cubic foot is 81.25 pounds the weight of the whole is 43,556 by 81.25=3,538,925 pounds or roughly 1,770 short tons. If the coal bed is 3 feet thick then the tonnage per acre would be 1,770 by 3=5,310 tons. If the territory underlain by a 3-foot bed is 25 square miles or 16,000 acres, then the total coal in the ground was originally 5,310 by 16,000=84,960,000 short tons.

The figures given above are supposed to represent the total coal in the coal bed, but not the amount that could be recovered in actual mining. In order to determine the amount that actually could be recovered, it is necessary to allow for pillars that cannot be removed, for partings that may come into the bed and replace good coal, and for the amount of coal lost by dikes and faults cutting the coal bed. As there are little or no data available in this field regarding the factors mentioned above, an accurate estimate is not possible, but, if the mining conditions, as developed in the Cumnock mine, hold throughout the territory included between the outcrop of the coal bed and the line Y Z it is probable that 80 per cent of the coal in the bed can be recovered. Eighty per cent of 84,960,000 tons is 67,968,000 tons or the estimated tonnage of recoverable coal in this field west of the Deep River fault. The amount of coal east of this fault cannot be estimated at the present time, for there is little or no positive evidence, that the coal is more than 2 feet thick in any part of this territory and a bed of this thickness can hardly be considered workable at a depth under present conditions. If drilling in the territory east of the fault should reveal a coal bed more than 2 feet in thickness. it would be worth considering in a commercial way, but until drilling is done it is useless to speculate whether or not there is a supply of workable coal east of this fault.

Similarly there may be workable coal southwest of Haw Branch, but the surface indications are not favorable and additional data can be obtained only by prospecting with pick and shovel or preferably with a core drill.

CHARACTER OF THE COAL

The coal of the upper bench of the Cumnock bed is known only in the Cumnock and Carolina mines where it is a jet black coal with few, if any, dull bands. In other parts of the field, particularly toward the southwest, the coal bed is broken up by layers of shale which detract greatly from its value. In the mine mentioned above the coal is fairly homogeneous in texture and quality throughout.

Cleavage is highly developed in the coal, the principal cleavage planes being at right angles to the strike of the bed. The cleavage is so marked that, on a face of coal parallel with these planes, the coal cleaves off in thin layers, ranging in thickness from about one-eighth to one-half inch. One can, with the hand, peel these thin laminæ off the face to an almost indefinite depth. Naturally a coal so highly cleaved as this coal is, will produce a very small percentage of lump when mined and hence the coal in its raw state is not well adapted to domestic use. In the run-of-mine form there are few fragments larger than one's hand, and even fragments of this size are liable to be broken much finer in handling and shipping.

Very great ignorance prevails, even in the Deep River Field itself, regarding the quality of the coal now being mined there, and outside the limits of the field, few persons know anything about it. The writers have been assured that the coal is worthless; that locomotive tests have been attempted in times past with this coal, but that it was so poor that the locomotive went "dead" on the road, the coal being of such a quality that it would not produce enough steam to run a light engine. The writers do not question the reports that such tests were made, but they do maintain that, if such tests were made and resulted as disastrously as reported, the material used was not the best nor even the average coal of the upper bench, or if it came from this bed it was outcrop coal which had weathered to such an extent that it had lost most if not all of its heating value. It is possible, of course, that these tests were made on coal from the lower bench, and, if that were the case, the failure could be easily explained for the heating value of this coal compared with that of coal from the upper bench, is as 10,400 to 13,700, or only 76 per cent as efficient in the production of heat.

For the seven years prior to 1922 the Cumnock mine has been owned and operated by the Norfolk Southern Railroad Company, and practically the entire output of the mine has been used by that company for locomotive fuel and for stationary steam plants along the right-of-way. If the coal were as poor as some have believed, it could not have been used in this manner.

In order to determine the true value of the coal, the writers cut one sample in the mine of the Carolina Coal Company for analysis and Mr. J. J. Forbes of the United States Bureau of Mines cut several samples in both the Carolina and the Cumnock mine for the same purpose. The results of the analysis of these samples in the Pittsburgh laboratory of the Bureau of Mines are given in the following table, together with the analyses of other coals of the Appalachian region

with which the Deep River coal may come in competition. analysis, as a matter of convenience, for various users, is presented in three forms, marked A, B, and C. Form A represents the coal in the same condition as it was in the mine before the sample was cut for sampling, the coal sent to the laboratory, was sealed air-tight in a galvanized-iron can so that it reached the laboratory without taking on or giving off moisture; form B represents theoretically dry coal; and form C represents the theoretical condition of the coal after all moisture and ash have been eliminated. The percentage given in form A are the ones that should be used in the comparison of coals and in the study of a coal with respect to its adaptability to certain uses, for this form more nearly represents the coal that is actually shipped and fed into the furnace than are those given in either form B or form C. Form B is the one most used by mechanical engineers, because it is a more stable form of fuel than is form A, and the mechanical engineer is more concerned in the testing of apparatus than he is in testing coal. Form C is used only when it is desirable to compare the coal substance itself of one coal with another, regardless of impurities, or when the relation of the volatile matter to the fixed carbon is the all essential consideration. The forms B and C are adapted for special purposes only and should not be used by the ordinary operator, purchaser, or consumer of the coal.

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A	ANALISES OF COAL SAMPLES FROM THE DEEP KIVER COAL FIELD	L CELL	I KON	1 1 1 1	DEE	IL KIV	EK C	OAL	FIEL			2 1	
		Analysis Form	Form		Proximate	mate			D	Ultimate	34	1114	Heating value
	Location	N o	Anal-	Mois-	Mois- Volatile Fixed ture matter carbon	Fixed	Ash	Sul- phur	Hydro- gen	Hydro- Carbon Ritro-	Nitro-	Oxy-	B. t. u.
Cumnock Coal Mine J. J. Forbes, Collector April 14, 1922	Room 1. off No, 1 rise	85446	CBA	2.5	31.0 31.7 35.3	56.6 58.1 64.7	9.9	3.0					13,240 13,570 15,110
	Room 10 on right side of No. 1 slope	85447	Q M D	1.8	32.2 32.8 35.1	59.6 60.6 64.9	6.4	8.1 8.1 9.1					14,030 14,280 15,280
	Room 13, off No. 1 slope	85448	CBA	4.2	31.9 33.3 36.7	54.9 57.3 63.3	9.0	2.0					13,250 13,830 15,260
	Room 8, off No. 1 slope	85449	CBA	1.7	34.1 34.7 37.6	56.6 57.6 62.4	7.6	1.9	Lag.			§	13,770 14,010 15,170
Composite of mine samples 85446, 85447, 85448, and 85449]		85450	CBB	2.5	32.0 32.9 35.9	57.3 58.7 64.1	8.2	2.0	5.3	75.5 77.5 84.6	2.0	7.0	13,620 13,970 15,260
Carolina Coal Mine M. R. Campbell, Collector Jan. 21, 1922	Face of No. 1 left entry, 75 feet from foot of main slope	83960	4 M D	1.8	32.5 33.1 35.6	58.8 59.9 64.4	6.9	2.2.4	5.2	77.1 78.5 84.4	2.1	6.3	13,890 14,140 15,200

Carolina Coal Mine	Rib of left air-course, 700 feet			-			-		_	1		-		
J. J. Forbes, Collector April 17, 1922	from the mine mouth	85590	CBA	2.3	32.4 33.2 36.2	57.2 58.5 63.8	8.3	2 5 3 5					13,630 13,950 15,210	
	No. 1 cross entry, 100 feet in, by slope air-course	85591	AWO	1.7	32.2 32.8 35.5	58.4 59.4 64.5	7.7	2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2					13,790 14,030 15,220	
Carolina Coal Mine J. J. Forbes, Collector April 17, 1922	Main slope, 100 feet out by face and 750 feet from mine mouth	85605	4 M O	1.9	32.1 32.7 35.3	58.8 59.9 64.7	7.2	2 2 2 4					13,930 14,190 15,330	
Composite of mine samples 85590, 85591, and 85605		85592	4 M O	2.0	32.4 33.0 35.8	58.1 59.3 64.2	7.5	2.3	5.1 5.0 5.4	76.5 78.0 84.5	1.9 1.9 2.1	6.7 5.1 5.5	13,810 14,090 15,260	
Composite of two mine samples of lower bed		85595	CBA	1.8	29.0 29.5 41.9	40.2 40.9 58.1	29.0	2.9 3.0 4.3	4.4	57.2 58.3 82.7	1.7 2.4 4.2	4.8	10,450 10,650 15,120	

ANALYSES OF COALSAMPLES FROM OTHER FIELDS, WITH WHICH THE DEEP RIVER COAL MAY HAVE TO COMPETE

			Manufacture and other Persons and								
	Form		Proximate	mate				Ultimate			Heating
	Anal- ysis	Moisture	Volatile matter	Fixed	Ash	Sulphur	Hydrogen	Carbon	Nitrogen	Oxygen	B. t. u.
Pocahontas field, W. Va.—Best coal	A	1.7	16.5	76.0	5.8	ī.	4.3	84.2	1.1	4.1	14,490
New River field, W. Va.—Best coal	A	2.1	21.6	71.9	4.4	1.5	4.7	83.1	1.6	4.7	14, 540
Dante field, Va.—Best coal	A	2.4	34.7	55.8	7.1	9.		78.2	1.5	7.3	13,930
Toms Creek, Va.—Best coal	A	2.2	32.4	59.2	6.2	9.	5.2	79.7	1.6	6.7	14, 130
Big Stone Gap field, Va.—Best coal	¥	2.2	33.7	56.4	7.7	∞.	5.1	77.2	1.5	7.7	13,790
Morgan Co., Tennessee—Best coal	¥	2.1	37.2	54.7	6.0	2.7	5.5	76.5	1.8	7.5	13,880
Claiborne Co., Tennessee—Best coal	¥	3.7	36.5	57.0	2.8	1.0	.č	78.2	1.9	10.6	13,980
Claiborne Co., Tennessee Medium coal	Ą	5.2	31.7	55.1	8.0	6.	5.0	72.6	1.8	11.7	12,790
						-					

In using the figures given in the table of analyses it should be remembered that the sampler is much more careful in excluding impurities than is the miner or even the operator in time of great scarcity of coal, and consequently the coal that reached the market from these mines is liable to contain much more ash than that shown in the analysis of the mine samples.

A comparison of results obtained on mine samples and on railroad car samples shows that on the average the ash in the car sample may be from 30 to 50 per cent greater than it is in the mine sample. Thus coal which shows 6 per cent ash in the mine sample is likely in the car sample to run from 7.8 per cent to 9 per cent, but if the increase exceeds 50 per cent, it indicates gross carelessness in mining the coal or preparing it for the market.

The composition of the mine sample may be regarded as the ideal toward which the commercial coal of the mine approaches more and more closely as better methods and more care is exercised in mining, and commercial coal will agree with the mine sample when the best methods are used and every employee coöperates with the management in excluding impurities from the output of the mine.

As the most important point in the consideration of the value of a coal for ordinary purposes is its heat-producing power, the column headed B. t. u.¹ in the table of analysis is worthy of most careful consideration. As a direct comparison of figures is not easy to make, the graph, shown in Fig. 6, has been prepared to show the comparative heating values of the coals listed in the table of analyses. It is apparent from the graph that Cumnock coal is somewhat inferior in heating value to the best Pocahontas and New River coals, and that it is about the same as the coal mined at Dante, Toms Creek, and Big Stone Gap, Virginia, and Oliver Springs and Jellico, Tennessee, but is considerably better than the poorer coals mined in most of these districts.

The table of analyses shows that the Cumnock coal is relatively high in sulphur, averaging in eight mine samples, 2.2 per cent, as against an average of 1.1 per cent in the other coals listed in the table. The difference between 1.1 and 2.2 is not serious, unless the coal were used for the manufacture of metallurgical coke, where difference of 1.1 per cent would be a rather important matter. In steam-raising the percentage of sulphur in the Cumnock coal will probably have little

¹B. t. u. is an abbreviation of the term British thermal unit. This unit is the one by which heat is generally measured and expressed in English speaking countries. The heat-producing value of a coal is determined in the laboratory by exploding a small amount of coal within a steel bomb and carefully measuring, by a delicately graduated thermometer the increase in temperature. The amount of heat thus generated is expressed in British thermal units, one of these units being the amount of heat required to raise one pound of water one degree Fahrenheit, the water being at the temperature of maximum density, 39.1 degrees F.

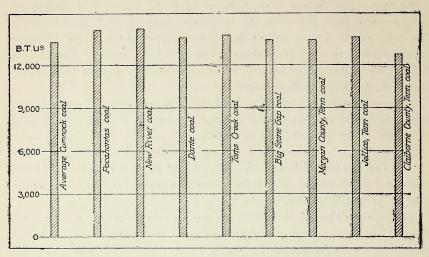


Fig. 6. Graph illustrating comparative heating values of competing coals.

or no effect, except that the sulphur will tend to corrode the grate bars more rapidly than pure coal. It should be remembered by operators, however, that the sulphur in the coal as shipped to market is liable to be much greater than that shown in the mine samples. This is an imminent danger, for in places the coal contains many "sulphur" balls from 1 inch to 2 or more inches in diameter. In mine sampling these nodules of pyrite were excluded from the samples on the theory that in actual mining it is possible to remove them if the coal is properly hand-picked, and no careful operator who is at all mindful of the reputation of his output, will allow such material to remain in the commercial coal.

TESTS BY THE BUREAU OF MINES

The Deep River coal is generally regarded as a coking coal, but up to the time of the present examination, no reliable test of its coking properties had been made, or if made, the writers were not aware of the fact. The coal has been noted since its earliest exploitation as a fine smithing coal and this in itself is an indication of its coking quality, as one of the prime requisites of a smithing coal is that it will coke and thus make a "hollow" fire.

At the request of Col. Joseph Hyde Pratt, State Geologist, the United States Bureau of Mines has recently made tests of the coking quality of the Deep River coal and of its adaptability to washing as a means of reducing the sulphur and ash so as to make it suitable for the manufacture of metallurgical coke. Through the courtesy of the

Director of the Bureau of Mines the essential features of these tests are given herewith.

A large sample of washed coal from the top bench in the Cumnock mine was tested at the Experiment Station of the United States Bureau of Mines at Pittsburgh, Pennsylvania, for its coking properties and for the by-products which it would yield in the operation. The sample of washed coal which was to be tested had the following composition:

PROXIMATE AND ULTIMATE ANALYSES OF WASHED COAL AND COKE

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The results of the laboratory coking tests on the washed coal is as follows:

Final coking tempera	atures	,	. **	. 10		775° to 800° C.
Weight of charge					11.11	15 pounds.
Coke yield		., ., .	 			75 per cent of charge.
Gas yield						8,000 cu. ft. per ton of coal.
Ammonium sulphate						23 pounds per ton of coal.
Tar (dehydrated)			100		•	13.9 per cent of coal charged
						or 22 gallons per ton.

The report of the Bureau of Mines on this test is as follows:

"The by-product yield of this coal is entirely satisfactory and compares favorably with yields from Freeport, Pa. coal. It is felt that with a full cooking temperature (950°C.) and 18 hours time, it would be reasonable to expect a 70 per cent yield of matallurgical coke, 10,000 to 12,000 cubic feet of good gas, 11 gallons of tar, and 25 to 27 pounds of ammonium sulphate. In general, the coke, as far as it can be judged by a laboratory scale test, is of very good quality fully equal in all respects to Freeport or Pittsburg cokes. The sulphur in the coke is somewhat high (1.3 per cent), but this could be cut down by admixture of a low-sulphur steam coal. Such a mixture of coal is now considered to be good by-product practice."

This test seems to establish the coking quality of the Deep River coal and also the fact that even by washing, the sulphur is too high to yield a metallurgical coke without the admixture of a coal containing less sulphur. As there is probably little or no demand for this kind of

coke in North Carolina, the relatively high percentage of sulphur is not an important matter. It seems probable that the best market in the State for coke is for domestic use as a substitute for anthracite, and for this use the sulphur is not excessive. In an agricultural country, such as central North Carolina, it is probable that the ammonium sulphate is a very important, if not the most important, by-product of the coking process. In using the figures given in such a report, it should be understood that the results of a general test are significant only in suggesting what may be secured in actual practice, but the actual yield of any by-product depends largely upon the method used, and the method best suited to produce a large quantity of a certain constituent is not the one best suited to obtain a large yield of another constituent.

The results of the Bureau of Mines test show that, if the coal is coked in by-product ovens, a good quality of coke may be secured for domestic or manufacturing purposes, a normal amount of gas, a rather large yield of ammonium sulphate for the cotton and tobacco fields, and a medium amount of tar.

As the two coal beds in the vicinity of Cumnock are only 18 inches apart, they may easily be regarded as two benches of a single coal bed, but there is no advantage in so considering them unless the coal contained in the lower bench, as well as the black band (iron carbonate) between them, can be utilized. As shown by the analyses of the coal from the lower bench that are given in the table (p. 83), the coal in the raw state contains too much ash to be salable in competition with better coals, therefore if it is to be utilized, some way of improving its condition must be devised. In order to determine the possibility of reducing, by washing, the percentage of ash in the lower bench from about 30 per cent to 6 or 8 per cent, a washing test was made by the United States Bureau of Mines. In order to make a thorough test about 1,150 pounds of coal was sent to the Bureau of Mines testing laboratory at Urbana, Illinois, and elaborate float-and-sink test were made with liquids ranging in specific gravity from 1.3 to 1.8. Tests were also made in washing the coal in jigs and on tables, but without very satisfactory results.

The conclusions arrived at by the Bureau of Mines experts are as follows:

The sample of coal received at the laboratory representing the bottom bench of the Cumnock bed from the Farmville (Carolina Coal Company's) mine, consists very largely of bony coal and carbonaceous shale. Only a small amount of coal low in ash content is present. It is, therefore, impossible to treat this coal successfully by the usual coal-washing methods to secure a reasonable yield of coal as low in ash content as the coal of the top bench (8 to 10 per cent, of the bed). The treatment of this coal at ½ inch minimum size on

either jigs or tables would probably yield 50 to 70 per cent of washed coal with an ash content in the neighborhood of 24 per cent.

As stated before, this test shows that washing will probably not improve the coal of the lower bench sufficiently to justify the erection of a washery and therefore some other method must be sought, if this bench of the coal is to be utilized at the same time that the upper bench is being mined.

As the sulphur content of the upper bench of the Cumnock coal bed is too great for the manufacture of metallurgical coke, a washing test of this coal was also made by the United States Bureau of Mines at its Urbana, Illinois plant to see if it were possible by ordinary washing methods to materially reduce this element. Elaborate tests were made by float-and-sink methods, by washing in jigs, and by washing on tables.

The coal to be tested was crushed to different sizes and subjected to a float-and-sink test on liquids of various densities with the result that it appears to be entirely feasible to reduce both the sulphur and ash by washing processes. The float-and-sink test showed that with a solution whose specific gravity is 1.5 the ash could be reduced from 12.7 to 6.5 per cent; the sulphur could be reduced from 2.32 to 1.76 per cent; with a consequent loss of the sample tested of 9.4 per cent.

After this preliminary test had been made the raw coal was washed in a jig. This test yielded 87.6 per cent of washed coal, having 7.1 per cent of ash and 1.85 per cent of sulphur. The results of this test are very satisfactory, as far as the ash is concerned, but rather disappointing as the percentage of sulphur was not materially reduced. A table test showed a yield of washed coal of 87.6 per cent, having an ash content of 7.1 per cent, and a sulphur content of 1.79 per cent. A table test of coal crushed finer than that noted above, yielded 90.0 per cent of washed coal, having 6.8 per cent of ash and 1.82 per cent of sulphur.

As these various tests agree very closely, it may be said that, as far as a single test on a small scale will determine, the coal from the upper bench of the Cumnock bed, if subjected to washing in a jig, would have its percentage of ash materially reduced, but that, as far as the sulphur is concerned, the results hardly justify the expense of the operation.

The failure to greatly reduce the content of sulphur is explained as follows:

The general sample representing the entire lot of coal contained 1.52 per cent of pyritic sulphur and 0.80 per cent of organic sulphur. The total sulphur content amounted to 2.32 per cent, of which 34.5 per cent was present as organic sulphur and 65.5 per cent as pyritic sulphur. Sulphate sulphur was not determined as the analysis made at the Pittsburg station of the mine

samples showed a maximum value of only 0.026 per cent. . . . This condition is favorable for a good sulphur reduction, but it is counterbalanced by the finely disseminated nature of the pyritic sulphur present in the coal.

Ash reduction by Trent process.—A final attempt to reduce the percentage of ash in the coal of the lower bench of the Cumnock coal bed was made by the Trent process—a patented process which, in certain coals, will reduce the ash very materially indeed. The test was made at the works of the company in Alexandria, Virginia.

The Trent process for reducing ash in coal, consists in dry pulverizing the coal so that it will go through 100-mesh sieve; wetting of the pulverized material with water from the tap; and then the addition of a small percentage of standard Navy fuel oil. The oil tends to unite with the carbon, freeing the earthy matter which settles to the bottom.

The sample to be tested, which consisted of run-of-mine coal from the lower bench in the Carolina mine, had the following composition: moisture, 1.4; volatile matter 29.4; fixed carbon 42.0; ash, 27.2. The so-called "amalgam" resulting from the combination of the oil and carbon had the following composition: volatile matter, 48.5; fixed carbon, 38.1; ash, 13.4. If this amalgam is then subjected to low temperature distillation until the oil that has been added is driven off, the resultant purified coal contains 17.1 per cent of ash.

If the coal were treated by this process, the result would be the so-called amalgam which contains about 21.6 per cent of fuel oil in addition to the finely divided carbon and ash, or if the oil were distilled it would leave only the finely divided carbon and ash. In either form the product can be used as a fuel—if in the amalgam form with a content of ash of 13.4 per cent and if in the form of dry purified coal with an ash content of 17.1 per cent.

The reduction of the ash by this process is rather disappointing and is said to be due to the fact that the earthy material is present in a very finely divided condition and this means that to reach the carbon itself, the crushing would have to be possibly to 200 mesh which would be quite expensive.

There is no question about the effectiveness of this process, but in certain cases the reduction in the ash is not nearly so marked as in others. The operator considering this process should calculate closely the cost of separating this bench of coal from the upper bench, its crushing down to the required degree of fineness and finally the marketing of the product, either in the form of oil-amalgam, powdered fuel, or briquettes made from the powdered material.

POSSIBILITIES OF PETROLEUM IN THE DEEP RIVER FIELD

Much speculation has been indulged in here as well as in other States crossed by the belt of rocks of Triassic age as to the possibility of obtaining oil or gas from the sandstone which forms such a large proportion of their bulk. Many reports are current regarding so-called oil seeps and gas is supposed to bubble up through the water in many of the streams. The writers examined a number of these localities supposed to show signs of oil, but none was seen, though the oxide of iron which generally forms an iridescent scum on stagnant water was seen at a number of places. Persons finding such an iridescent scum on water may easily test it by stirring the water with a stick. If the scum can be drawn out and stirred into whorls without breaking, it is probably oil of some kind, but if it is brittle and breaks when stirred, it is oxide of iron and worthless.

As there are apparently no signs of petroleum at the surface, the next step in the investigation is to study the rocks of the region to see if the conditions, which by long experience geologists have come to regard as essential, are present or not, for in many of the well known oil fields there were absolutely no surface indications of the presence of oil or gas before drilling began. In conducting the geologic study of the possibility of oil pools there are four elements that enter into the problem. These are: (1) the presence of rocks of such a character that they may have served as the place of origin or source of oil or gas; (2) porous sandstones or limestones into which the oil when formed, can collect; (3) a geologic structure or fold of such a character that it will trap the oil and gas as they migrate through the porous rock; and (4) a nonporous shale or clay above the sandstone to seal in its oily contents and prevent their escape.

(1) As petroleum has been derived largely, if not wholly, from organic remains which were buried in the mud or sand that now form the country rock, it will be necessary to find a fairly thick formation which contains fossil remains in abundance. All of the Newark rocks of the Deep River Field appear to have been laid down in fresh water or on the land, hence they do not contain a marine fauna from which the oil could have been derived. The presence of beds of coal and some black shale are indications of abundant vegetal growth, but in all except the Cumnock formation the materials are so coarse that air could easily have reached the enclosed vegetal matter and cause its destruction. The black shale and coal of the Cumnock formation would probably supply some material for the formation of oil, but the volume of such shale and coal is so small that the amount of oil that may have been produced from them in the past is negligible. It is true that

some layers of the shale are quite rich in bituminous material, and that at one time there was a manufacturing plant in operation at Farmville for the distillation of oil from the shale and coal, but, as described on a previous page, the Cumnock formation is in many parts of the field apparently thin and in places is apparently replaced by red conglomerate, and consequently the volume of possible oil-producing shale is small. On account of this replacement toward the southeast, the part of the field most promising, as a source of oil, is about Cumnock and Gulf where the formation is thickest and contains the most bituminous material. But here erosion has cut deeply into the formation without exposing any trace of the coveted substances.

- (2) There are many beds of porous sandstone in the Cumnock formation, where it is well developed, that might serve as reservoirs for oil or gas, and even in the overlying Sanford formation there are coarse brown sandstones that might serve a similar purpose, if other conditions were favorable.
- (3) Wide experience of petroleum geologists all over the world has demonstrated that about 90 per cent of the oil is found in anticlines or arches in the rocks, hence the first thing the oil geologist does is to look for such structures. As stated previously there are few known anticlines in this field. In general the rocks have been depressed into basins or troughs rather than raised into anticlines or arches. Thus the Carthage and the Corinth troughs are both essentially synclinal in structure, although in each case the scycline is not complete because of the great fault along the southeast side. On account of this structure neither basin nor trough can be considered a favorable place to drill for oil. As described previously these troughs are united by a cross-anticline at Colon, but this fold has raised the formation so high that the Cumnock formation crops out at the surface as far east as Colon, hence there are scarcely any rocks below the surface on this anticline that might be considered as sources of oil or gas. Another disturbing factor in this anticline is the possibility, if not probability that it is broken along its crest, by a fault which follows the system of dikes north to Colon and there turns to the northwestward to the margin of the Altogether the Colon cross-anticline does not seem promising from a geological point of view,

In referring to anticlines as the most favorable rock structures for holding accumulations of oil or gas, it must be understood that this statement applies only to rocks that are saturated with water and that in dry rocks the oil accumulates, if it accumulates at all, in very different places. This is illustrated by Fig. 7, which is supposed to be a cross-section representing the rocks as they would appear in the side of

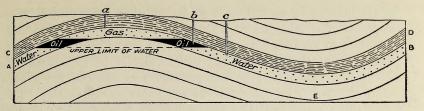


Fig. 7. Diagram showing form of oil pools in an anticline.

a deep trench cutting an anticline and a syncline. A B represents a moderately coarse porous sandstone which is the reservoir rock. C D is the overlying impervious shale which serves as a blanket and retains any fluid that may be in the reservoir rock. As water is heavier than oil and as both of these substances are heavier than gas, the three will arrange themselves, under the influence of gravity, in the order shown in the figure, gas at the top, oil next lower in the anticline, and then water occupying almost all of the synclinal fold. If a well is drilled at a it will encounter gas; at b, oil; and at c, water. In some cases there is little or no gas and then the oil is forced into the crown of the arch and a well drilled at a would strike oil.

If the rocks are not saturated with water, then there is no force to drive the hydrocarbons into the anticline, and, under the pull of gravity, the oil would tend to migrate toward the bottom of the syncline at E. Such cases are seldom met with, but some of the oil pools in western Pennsylvania are in dry rocks and the oil, though much disseminated in the reservoir rocks, appears to be slowly migrating downward, but is arrested locally by denser portions of the sandstone and small pools on the limbs of the syncline are of common occurrence. If the oil is not trapped by barriers of dense rock, it finally reached the bottom of the syncline, but a pool in such a situation is rare indeed.

(4) The different beds of the formations in this field are not well enough known to enable one to say positively that any given porous sandstone is overlain by a nonporous shale, but generally the succession of shale and sandstone is the rule and it is probable that most porous sandstones have a shale cap. So far as this element of the problem is concerned, it may be taken for granted that it is favorable.

In addition to the elements of the oil problem enumerated above, geologists are now coming to acknowledge a fifth element in the degree of metamorphism which has affected the rocks and which is apparently all important in determining in advance of drilling or even geologic investigation whether or not there is a possibility of obtaining oil if a well were drilled. Metamorphism means change and changes in the

rocks are induced by crustal movements, probably accompanied by the development of sensible heat. When rocks have been squeezed to such an extent as to produce heat, their condition and character have been changed so that the geologist has little difficulty in recognizing the marks of this change and he can pronounce at once on the general question of whether or not the rocks are liable to contain oil. the crystalline schist and slate underlying the Newark rocks bear al! the ear-marks of having been greatly metamorphosed and no geologist would consider for a moment the possibility of their containing oil, except possibly very locally, where oil may have recently migrated into them from some adjacent oil-sand. The Newark rocks, on the other hand, on casual inspection, show no signs of having been affected by heat or pressure, but such a test is not always satisfactory, because in the incipient stages of change there is little outward effect apparent. The most satisfactory indication of metamorphism is the condition of the coal as shown by a chemical analysis (pp. 82 and 83). The comparison of many coal analyses in the Appalachian region shows that the great oil pools are found where the fixed carbon in the coal in the C form (see table of analyses) is less than 60 and that little if any oil is found where the fixed carbon is more than 65 per cent. fixed carbon in the Deep River coals ranges in the C form from 62.4 to 64.9, hence the rocks are metamorphosed to such an extent that it is doubtful if any oil remains, granting that it formerly existed in the rocks. It seems certain that no oil pool of consequence would ever be found in these rocks, but the chance for finding natural gas is much better than that for finding oil.

The relation of the dikes to the possible occurrence of oil has already been mentioned (p. 48), but it is worth repeating here for the benefit of those who may be tempted to drill test wells in this field. act as barriers to the circulation of water and the inhabitants have long ago learned that the most favorable place to find a supply of water is near a dike. If the dike serves as a barrier to the circulation of water, it doubtless would serve the same purpose to the circulation of oil, and hence, if there is any oil in the rocks, it would be liable to accumulate near the dike and a well located in such a position as to penetrate the oil sand near a dike would be much more likely to be successful than would one located at a distance from a dike. As many of the dikes are doubtless inclined one way or the other, it would be impossible to determine the exact distance from the dike on the surface at which a well should be located so as to penetrate a given sand close to the dike, but an attempt should be made to secure this sort of a location.

Conclusions.—From a geological point of view, the writers have no hesitation in saying that all of the evidence they were able to collect in the field, bearing on this question, is of a negative character. The thinness of strata bearing organic material and its apparent restriction to the northwestern margin of the troughs makes it impossible to conceive of it as a possible source of a commercial quantity of oil. But even if we grant that at some time in the past, oil may have been distilled from the organic material entombed in the rocks, there are few, if any, anticlines in which it may have accumulated, and without such structures the volatile constituents of the oil have had ample opportunity to escape through the coarse conglomerate which composes most of the Newark group.

As, however, many of the citizens of this field would like to see a deep well drilled so as to settle the question regarding the presence or absence of petroleum, the writers were on the lookout throughout the time spent in the field for a location that might be considered the best, from a geological point of view, to drill a test well, but after mature consideration of all of the facts that were obtained they regard all locations as unfavorable and are unable to say that any one location is more favorable than another. No one, even the most experienced geologist can say positively that oil does not occur in these rocks, but they can say that all of the facts obtainable are of a negative character, and that in their opinion it is not worth spending time or money in prospecting where conditions appear to be so unfavorable.

Sometimes the drilling of a test well will satisfy public opinion regarding the presence or absence of petroleum much better than the opinion of the most eminent geologist, but in such a case as the Deep River Coal Field, where there is no pronounced anticline, one well would test only the possibilities in its immediate vicinity, but would tell nothing about oil possibilities in the territory surrounding the well. Under such conditions, it would require many wells, unless the driller were fortunate enough to strike oil in his first or second venture. Altogether the adequate testing of this field might prove to be very expensive, with no returns, and in such an event it would have been much better to spend the money in building good roads or in improving the soil, or in some enterprise that would redound to the benefit of the entire community, rather than in a hole in the ground that yielded nothing.



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NORTH CAROLINA DEPARTMENT OF CONSERVATION AND DEVELOPMENT

WADE H. PHILLIPS, Director

BULLETIN No. 34

DISCHARGE RECORDS

OF

NORTH CAROLINA STREAMS

1889-1923

PREPARED BY THE WATER RESOURCES DIVISION, STATE DEPARTMENT
OF CONSERVATION AND DEVELOPMENT

THORNDIKE SAVILLE . CHIEF HYDRAULIC ENGINEER

G. WALLACE SMITH ASSISTANT ENGINEER



COOPERATION BY THE U. S. GEOLOGICAL SURVEY

N. C. GROVER, Chief Hydraulic Engineer

E. D. Burchard, District Engineer for North Carolina

J. H. Morgan, Office Engineer for North Carolina

RALEIGH
EDWARDS & BROUGHTON COMPANY
1925



STATE OF NORTH CAROLINA DEPARTMENT OF CONSERVATION AND DEVELOPMENT

RALEIGH, N. C., NOVEMBER 16, 1925.

To His Excellency, Hon. A. W. McLean, Governor of North Carolina.

Sir:—There has been prepared in coöperation with the United States Geological Survey a report of the Discharge Records of North Carolina Streams which is presented herewith and recommended for publication as Bulletin No. 34 of the publications of the North Carolina Department of Conservation and Development.

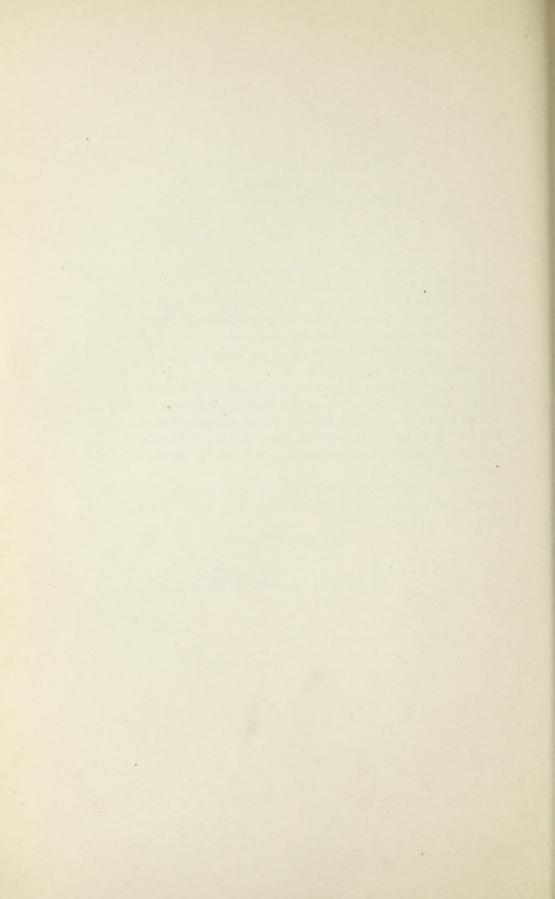
This report was begun at the time Col. Joseph Hyde Pratt was director of the North Carolina Geological and Economic Survey, continued under the directorship of Mr. Brent S. Drane and completed during the first few months of the Survey's successor, The North Carolina Department of Conservation and Development, with Mr. W. D. Harris as acting director.

There is a very large demand for information regarding stream flow for water supply and water power, and it is believed that this report will be of unusual economic value.

Very respectfully,

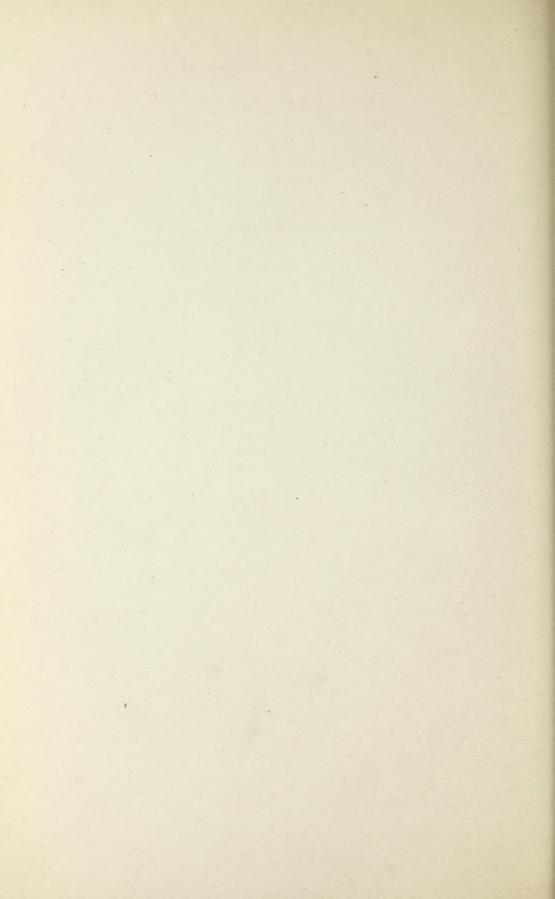
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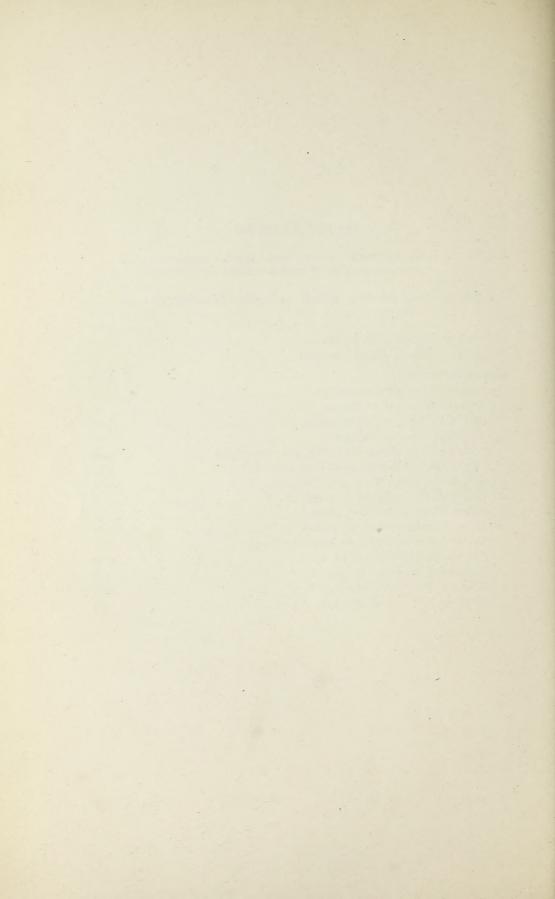
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INTRODUCTION

The compilation of stream flow records contained in this Bulletin was begun in 1922 at the time when Col. Joseph Hyde Pratt was Director of the N. C. Geological and Economic Survey. It was continued under the directorship of Brent Drane, and completed during the first few months of the Survey's successor, the present Department of Conservation and Development, with William D. Harris as

Acting Director.

Every effort has been made to include in this Bulletin all records of stream flow ever made in North Carolina prior to December 31, 1923. All old records or long term records have been carefully reviewed and corrected by J. H. Morgan, of the U. S. Geological Survey. This Bulletin, therefore, succeeds and renders obsolete the stream flow data in Bulletins 8 and 20 issued by the N. C. Geological and Economic Survey. By far the majority of the data in the present Bulletin have been taken from official and corrected records of the U. S. Geological

Survey.

In general the procedure followed in preparing the Bulletin has been for the District Office of the U. S. Geological Survey at Asheville, N. C. to prepare a description of each station where stream flow records have been made and to furnish corrected tables of daily and monthly discharge. This information has been sent to the Water Resources Division of the State Department of Conservation and Development. This Division has then prepared tables of weekly stream flow, rearranged the monthly records from the climatic to the calendar year, prepared duration tables and curves of weekly stream flow for long term records, checked all data, and prepared the manuscript for publication. The entire work was inaugurated and has been carried to completion by the Water Resources Division.

All stream gaging work now carried on in the state is performed by the forces of the U. S. Geological Survey with district headquarters at Asheville and under the immediate supervision of E. D. Burchard, District Engineer. The Water Resources Division of the State Department of Conservation and Development indicates in general where gaging stations are desired, arranges for municipal and private coöperation in obtaining funds for stream gaging, publishes compilations of stream flow records, maintains about two-thirds of the cost of the Asheville Office of the U. S. Geological Survey, and in general works in the closest coöperation with the Survey in carrying on stream gaging

in the state.

The present Bulletin is unique in several ways. It is the first publication of the kind to present tables of weekly stream flow and to give duration curves of weekly stream flow for all long term records. This departure will mean a great saving of time to engineers and others concerned with investigating stream flow for water supply, waterpower, or other purposes. Heretofore the engineer has had to rely

either on tables of monthly stream flow which are usually not of sufficient accuracy for detailed studies, or has had to use tables of daily stream flow from many isolated publications which imposed a great burden of time and effort. In general this Bulletin is believed to be the most comprehensive and useful compilation of stream flow data ever issued by any state east of the Rocky Mountains.

It is intended each year hereafter to issue tables of weekly and monthly stream flow for each gaging station in operation, and to have these available as soon as possible after the end of the calendar year. Every ten years the data will be reviewed, corrected, and bound as a sup-

plement to the present Bulletin.

Especial attention is called to Plate II, showing graphically the location of, and length of record at, each station where stream flow measurements have been collected. It will be observed that there are a number of long term records which are of great value. A stream flow record is of little use in presenting information as to what may be counted on for water supply or water-power purposes unless it has been kept for at least ten years continuously, or can be correctly related to a long term record at some other station. A number of new streamflow stations were established in 1924 and 1925 which are shown on Plate II, but no records appear in the Bulletin for stations established after December 31, 1923. Persons desiring information on stream flow at points for which data is not presented in this Bulletin are advised to write to the Water Resources Division, State Department of Conservation and Development, Chapel Hill, N. C. It is possible that new stations have been or will be established in the area for which information is desired.

The Water Resources Division makes intensive investigations of water-power, water supply, and other hydrological subjects, the result of which are published from time to time. A list of such investiga-

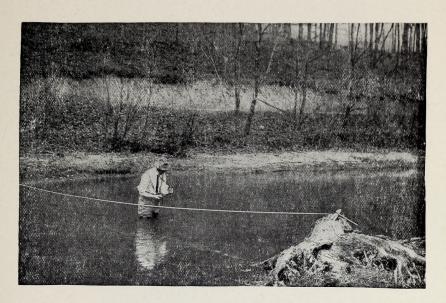
tions is given on the last page of this Bulletin.

DEFINITION OF TERMS

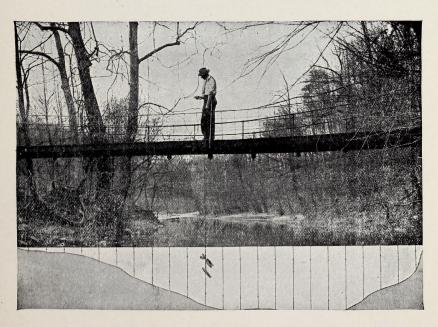
The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miners' inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, acre-feet, and millions of cubic feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross-section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental

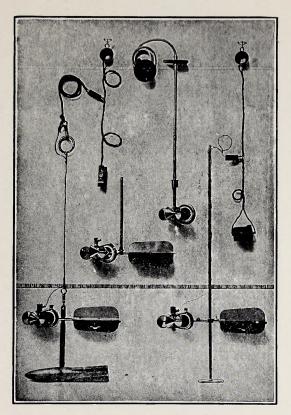
unit from which others are computed.



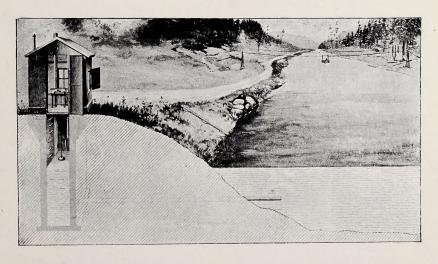
A. TYPICAL GAGING STATION FOR WADING MEASUREMENT



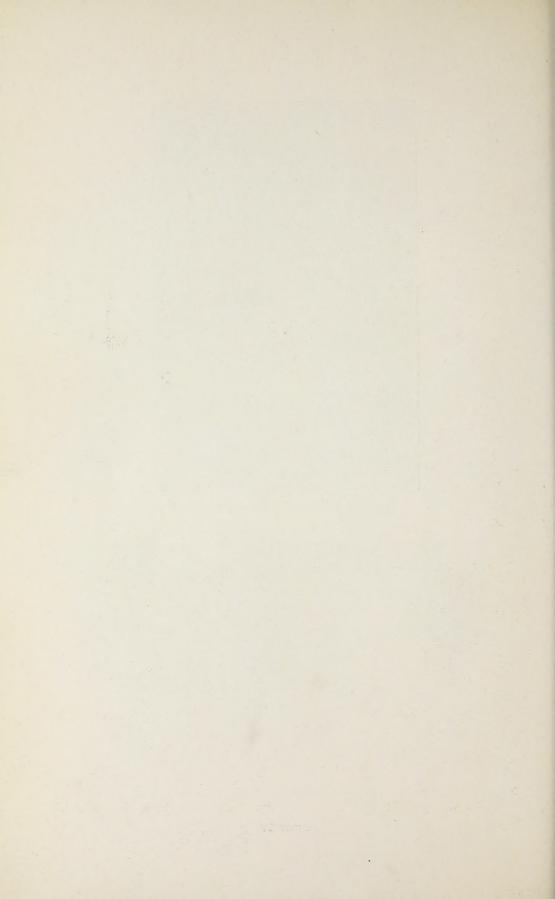
B. TYPICAL GAGING STATION FOR BRIDGE MEASUREMENT



A. PRICE CURRENT METER



B. TYPICAL CABLE GAGING STATION WITH AUTOMATIC WATER STAGE RECORDER



"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in inches.

An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is com-

monly used in connection with storage for irrigation.

The following terms not in common use are here defined:

"Stage-discharge relation," an abbreviation for the term "relation

of gage height to discharge."

"Control," a term used to designate the section or sections of the stream channel below the gage which determine the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

The "point of zero flow" for a gaging station is that point on the gage—the gage height—at which water ceases to flow over the control.

Tables for converting discharge in cubic feet per second into other units of discharge, and tables of convenient equivalents used in hydraulic computations, will be found at the end of the Bulletin, in Table 6.

EXPLANATION OF DATA

Collection of Basic Data

The base data collected at gaging stations consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff gage or from a water-stage recorder that gives a continuous record of fluctuations. Measurements of discharge are made with a current meter by the general methods outlined in standard textbooks on the measurement of river discharge. See Plates III and IV.

From the discharge measurements rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to the gage heights, give the discharge from which the daily, weekly,

monthly, and yearly means of discharge are determined.

The data presented for each gaging station in an area covered by this report comprise a description of the station, a table showing the weekly discharge of the stream, and a table of monthly and yearly discharge and run-off. These tables contain data for the entire period of record at each station.

If the base data are insufficient to determine the weekly discharge,

tables giving daily discharge are published.

LOCATION OF STATIONS

Plate I at the end of the Bulletin shows a map of North Carolina and parts of adjoining states. On this map are indicated the

TABLE 1 Data Relating to River Stage Stations of the United States Weather Bureau on North Carolina Streams

Richmond, Va.				Miles)
memmona, va	October 25, 1892	James	104	7,357
*Randolph, Va.	January 1, 1905	Roanoke	222	3,076
Weldon, N. C.	November 1, 1890	Roanoke	129	8,180
Danville, Va.	November 1, 1890	Dan	55	1,900
Clarksville, Va.	November 1, 1890	Dan	0.3	3,328
Rocky Mount, N. C.	July 1, 1910	Tar	86	775
*Tarboro, N. C.	January 1, 1905	Tar	46	2,100
Greenville, N. C.	January 1, 1905	Tar	21	2,678
*Enfield, N. C.	July 1, 1910	Fishing Creek	40	462
Neuse, N. C.	July 1, 1911	Neuse	140	735
Smithfield, N. C.	July 1, 1911	Neuse	105	1,255
*Fayetteville, N. C	November 1, 1890	Cape Fear	112	4,290
Elizabethtown, N. C	October 16, 1910	Cape Fear	73	5,087
*Moncure, N. C.	January 1, 1905	Haw	2	1,800
Conway, S. C.	December 1, 1893	Waccamaw	44	1,360
Cheraw, S. C.	April 1, 1891	Peedee	164	7,400
*Ferguson, S. C.	September 21, 1907	Santee	82	14,800
Mount Holly, N. C.	August 16, 1904	Catawba	143	1,774
Catawba, S. C.	July 1, 1906	Catawba	107	3,492
Camden, S. C.	March 1, 1891	Wateree	54	5,319
Columbia, S. C.	October 1, 1891	Congaree	52	7,972
Penrose, N. C.	December 1, 1917	French Broad	181	
*Asheville, N. C	March 19, 1903	French Broad	144	949
Marshall, N. C.	December 1, 1917	French Broad	113	
*Dandridge, Tenn	December 1, 1904	French Broad	42	4,450
*Newport, Tenn	November 1, 1906	Big Pigeon	6	655
*Greeneville, Tenn	January 1, 1916	Nolichucky	40	1,100
*Elizabethton, Tenn	December 1, 1909	Watauga	52	475
*McGhee, Tenn	September 1, 1904	Little Tennessee	17	2,470
Charleston, Tenn	February 1, 1883	Hiwassee	20	2,297

¹ And other dates.
2 Date unknown.
3 About.
4 Estimated.
* Also gaging station of United States Geological Survey.

 $TABLE\ 1$ Data Relating to River Stage Stations of the United States Weather Bureau on North Carolina Streams

		9						
Flood Stage (Feet)	Highest Stage (Feet)	Date	Lowest Stage (Feet)	Date	Width of River at Low Water (Feet)	Bank- ful Stage (Feet)	Width of River at Bankful Stage (Feet)	Elevation of Zero of Gage Above Mean Sea Level (Feet)
	20. 0	7 1 04 4004		10 1 2 20 4000	4 450			
10	23.2	December 31, 1901	-2.8	¹ September 29, 1899.	1,470	8	1,520	2.0
21	30.9	February 5, 1920	3.0	¹ September 5, 1909	250	16	300	303.7
30	51.6	November 26, 1877	6.7	¹ September 14, 1900.	400	31	660	17.0
8	17.0	March 15, 1912	-0.6	¹ October 20, 1904	600	8	800	379.3
12	427.0	November 27, 1877	-0.7	¹ October 9, 1905	450	8	472	259.2
9	19.0	August, 1908	0.3	¹ August 22, 1921	120 200	8	146	53.7
18	33.2	July 27, 1919		-0.5 September 11, 1921		12	225	11.2
14	24.5	July 28, 1919	1.8			12	275	1.4
15	21.0	April 19, 1910	0.2 July 28, 1921		100	14	140	³ 54 .0
15	24.8	July 24, 1919	0.0 September 20, 1916.		100	13	120	
14	26.3	July 24, 1919	1.0 November 1, 1910		100	13	150	99.6
35	68.7	August 29, 1908	0.2 October 8, 1897		200	35	440	20.2
22	41.0	August 29, 1908	-2.1	June 9, 1890	290	20	425	11.8
22	34.3	August 26, 1908	0.2	September 2, 1907	260	19	350	³ 154.8
7	10.2	September 7, 1908	-0.7	January 18, 1920	150	5	200	1.6
27	44.3	August 27, 1908	0.0	¹ August 2, 1866	315	27	500	60.7
12	24.7	July 22, 1916	-0.6	(2)	360	12	13,000	42.9
15	41.5	July 17, 1916	0.0	¹ August, 1885	425	9	500	558.8
12	40.4	July 17, 1916	0.9	(2)	510	11	650	437.6
24	40.4	July 18, 1916	0.0	June, 1884	540	23	800	131.9
15	35.8	August 27, 1908	-3.0	-3.0 October 5, 1904		15	1,330	117.7
13	26.8	July 16, 1916	1.8	1.8 October 13, 1918		14	108	2,066.1
4	23.6	July 16, 1916	-2.0 November 1, 1904		353	4	381	1,961.8
10	24.8	July 16, 1916	-0.4 November 26, 1922		300	16	320	1,624.0
12	28.0	May 21, 1901	-0.7 December 3, 1910		475	12	500	
6	17.0	April 2, 1920	0.4	October 3, 1919	150	6	160	1,040.8
16	16.0	July 16, 1916	1.8	January 6, 1918	235	16	280	
14	22.0	Feb. 27 or 28, 1902	0.5	(2)	170	14	280	1,486.0
20	39.0	March, 1867	1.0	November 29, 1904	580	18	625	751.1
22	32.5	March 31, 1886	-0.5	November 26, 1922	274	17	490	674.5
						4		

location of all gaging stations from which records of discharge are given in the Bulletin. There are also indicated the location of the U. S. Weather Bureau stations at which river stage is measured. A few of these river stage stations are also used as stream gaging stations. Table 1 gives the fundamental data collected at these U. S. Weather Bureau stations.

DESCRIPTION OF STATIONS

The descriptions of the stations given in this Bulletin contain in addition to statements regarding location and equipment, information in regard to any conditions that may affect the permanence of the stage-discharge relation, covering such subjects as the occurence of ice, the use of the stream for log driving, shifting of control, and the cause and effect of back-water. It gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

The accuracy of stream-flow data depends primarily (1) on the permanence of the stage-discharge relation and (2) on the accuracy of observation of stage, measurements of flow, and interpretation of

records.

A paragraph in the description of the station or footnotes added to the tables give information regarding the (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage heights to the rating table to obtain the daily discharge. ¹

For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," within 15 to 25 per cent.

These notes are very general and refer to the plotting of individual

measurements with relation to the mean rating curve.

DISCHARGE MEASUREMENTS

Tables of individual measurements of discharge at the gaging stations for which records are given in this Bulletin are not included herein. These measurements are used to determine the rating curves from which daily discharge is obtained. The construction and use of such curves require special skill and experience. Records of the individual discharge measurements may be found for most stations in the Water Supply Papers of the U. S. Geological Survey listed in Table 2. Copies of rating curves may be obtained at cost from the U. S. Geologica Survey, Jackson Building, Asheville.

Table 4 presents a series of miscellaneous measurements of discharge not made at regular gaging stations. Table 5 gives discharge meas-

urements made during the 1925 drought.

DAILY DISCHARGE

. This Bulletin contains no tables of daily discharge or of daily gage height at the various stations. The Bulletin is a compilation of complete station records, and the inclusion of daily data would have

¹For a more detailed discussion of the accuracy of stream-flow data see Grover, N. C., and Hoyt, J. C., Accuracy of stream-flow data. U. S. Geol Survey Water Supply Paper 400, pp. 53-59, 1916.

produced a volume of excessive bulk. In analyzing stream flow records for a period of years it is rarely necessary to use daily flow, and computations involving daily flow are usually regarded as an unnecessary refinement. However, tables of daily discharge and gage height form the basic data from which the weekly and monthly tables contained herein have been computed, and the tables of daily data for any single year or for the entire period of record can be furnished any one desiring them by application either to the U. S. Geological Survey, Jackson Building, Asheville, or to the Water Resources Division of the State Department of Conservation and Development at Chapel Hill. Blue

prints of the daily data will be furnished at cost.

Tables of daily discharge, and in earlier years tables of daily gage heights also, at stations operated by the U. S. Geological Survey may be found for single climatic years in the Water Supply Papers of the Survey. A list of these publications containing daily discharge data for stations contained in this Bulletin is given in Table 2. The table of daily discharge gives the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the mean daily gage heights may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders, the mean daily discharge may be obtained by weighting discharge for parts of the day or by use of the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

WEEKLY DISCHARGE

Tables of Weekly Discharge. These tables are given for the entire period of record at each station where the record is sufficiently complete to enable weekly discharge to be computed. Computations of weekly discharge have been made by averaging the daily discharge for consecutive seven-day periods. When leap years intervene the extra day has been included in the eight-day period covering the last of January and first of March. In non-leap years one eight-day period has been used, the same for each year. The seven-day periods used have also been the same for each year. Consequently the average weekly discharges in different years are strictly comparable.*

Duration Curves of Weekly Discharge. Fifteen diagrams are presented showing duration curves of weekly stream flow for the average and minimum years at those stations where the record is of sufficient length to enable representative average curves to be prepared. In preparing the duration curves duration tables of weekly stream flow have been made, but are not published. The tables give the weekly discharge each year in order of magnitude irrespective of occurence. To plot the average duration curve the average of the highest weekly discharge for each year for the total period is the first point, the average of the second highest the second point, and so on. The duration curve for the minimum year is plotted from the weekly discharges, arranged in order of magnitude, for that year having the greatest number of weekly

^{*}Table 3 indicates in detail how the weeks of every year are arranged for computing weekly discharge.

Table 2

List of Water Supply Papers of the U. S. Geological Survey which contain data on discharge measurements, daily gage height, and daily discharge of stations for which records of discharge are given in this Bulletin.

Number of Water Supply Paper	Year for which data is givent	
1	1896	
	1897	
7	1898	
6	1899	
8	1900	
5 and 75	1901	
3	1902	
7 and 98	1903	
26 and 127 and 128	1904	
68 and 169	1905	
03 and 204 and 205	1906	
42 and 243	1907 and 1908*	
62 and 263	1909	
82 and 283	1910	
02 and 303	1911	
22 and 323	1912	
52 and 353	1913	
82 and 383	1914	
02 and 403	1915	
32 and 433	1916	
52 and 453	1917	
72 and 473	1918	
02 and 503	1919 and 1920	
22 and 523	1921	
42 and 543	1922	
62 and 563	1923	

Complete files of these publications may be consulted at all U. S. Government depository libraries in the State, or at the Office of the U. S. Geological Survey, Jackson Building, Asheville, N. C., or at the Engineering School Library, University of North Carolina, Chapel Hill, N. C. Copies may be obtained for a nominal sum from the Superintendent of Documents, Government Printing Office, Washington, D. C.

^{*} Beginning in 1907, Water Supply Papers having numbers ending in "2" contain data for streams flowing east into the Atlantic Ocean, while those having numbers ending in "3" contain data for streams flowing west to the Ohio River.

† "Year" refers to the climatic year, ending in September of the calender year stated.

 ${\bf TABLE~3} \\ {\bf Arrangement~of~Weeks~Used~in~Computing~Weekly~Discharges}$

Week	Through				
1	January	1	January		
2	January	8	January1		
3	January	15	January2		
4	January	22	January2		
5	January	29	February		
6	February	5	February1		
7	February	12	February1		
8	February	19	February2		
9	February	26	March		
10	March	5	March1		
11	March	12	March1		
12	March	19	March2		
13	March		April		
14	April		April		
5	April		April1		
6	April		April2		
7	April		April 2		
8	April		May		
9	May		May 1		
20	May		May20		
21	May		May 2'		
22	May	7	June		
23	June		June1		
24	June		June1		
25					
26	June		June2		
	June		July		
27	July		July		
28	July		July1		
29	July		July2		
30	July		July29		
81	July		August		
32	August		August1		
33	August		August19		
34	August		August20		
5	August	27	September		
66	September	3	September		
7	September	10	September16		
8	September	17	September2		
9	September	24	September30		
00	October	1	October		
1	October	8	October14		
2	October	15	October21		
3	October	22	October28		
4	October	29	November		
5	November		November11		
6	November		November18		
7	November		November25		
8	November		December 2		
9	December		December 9		
0	December		December 16		
1			December23		
2	December				
4	December	24	December31		

flows lower than the average flow for the entire period of record. In some instances, where there are two low years of somewhat varying characteristics, the duration curves for each low year have been plotted.

MONTHLY DISCHARGE

Mean Monthly Discharge. Tables of mean daily discharge for each month are given for the entire period of record at each station. The monthly means are obtained by averaging the mean daily discharge for

each month.

Minimum Monthly Discharge. In the tables of monthly discharge the column headed "Minimum," gives the mean flow for the day of the month when the mean gage height was lowest. On streams having artificial regulation this term is subject to considerable error. The minimum discharge for the period of record at each station is given in the station description under "extremes of discharge." This is taken from the minimum observed gage height, and represents mo-

mentary discharge and not average daily discharge.

Maximum Monthly Discharge. In the tables of monthly discharge the column headed "Maximum" gives the mean flow for the day of the month when the mean gage height was highest. As the gage height is the mean for the day, and not the maximum reached during crest of a flood, the resulting discharge given does not indicate crest discharge, but only average discharge for the entire day when the mean gage height was greatest. The station descriptions give under "extremes of discharge" the maximum discharge for the period of record. This is taken from the maximum observed gage height and represents estimated discharge at the crest of the greatest observed flood.

Discharge in Second-feet per Square Mile. While the monthly means for any station may show with high accuracy the quantity of water flowing past the gage, the figures showing discharge per square mile and depth in inches may be subject to gross errors caused by the inclusion of large non-contributing districts in the measured drainage area, by lack of information concerning water diverted, or by inability to interpret the effect of artificial regulation of the flow of the river above the station as explained under the heading "Daily Discharge." Consequently the application of the discharge per square mile to drainage areas differing much from that at the station may lead to serious error.

Use of Discharge Data

The tables of monthly and annual mean discharge give only a general idea of the flow at the station, and this data should not be used for other than preliminary estimates. The tables of weekly discharge allow more detailed studies of the variation in flow and are sufficient for most purposes. For studies requiring great refinement tables of daily discharge should be obtained as indicated under the heading "daily discharge."

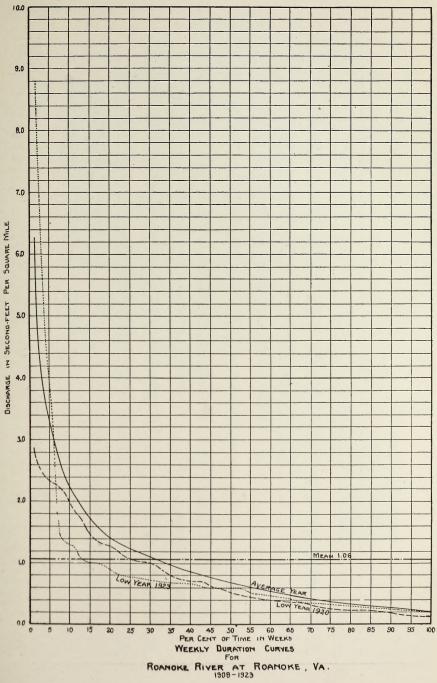
In making storage investigations, use of the monthly means will be found to indicate appreciably less storage than will actually be required. Hazen states* "If the matter of securing run-off data were to be taken up again, there would be much to be said in favor of weekly averages. The probable discrepancy between the required storage calculated from the weekly averages and the daily results would be so small that it could be overlooked. The weekly averages would be easier of analysis than the daily results, and would serve all practical purposes. The weeks are also all of the same length, and the slight errors introduced by the fact that the months are not of the same length would be avoided."

^{*} Storage to be provided in Impounding Reservoirs, Trans. Am. Soc. C. E., 1914, p. 1573.

ROANOKE RIVER BASIN

ROANOKE RIVER AT ROANOKE, VA.

- LOCATION. At Walnut Street highway bridge in Roanoke, Roanoke County. Drainage Area. 388 square miles.
- RECORDS AVAILABLE. July 10, 1896 to July 15, 1906; May 7, 1907 to December 31, 1923.
- GAGE. Chain on downstream side of Walnut Street bridge; read once daily by employee of Roanoke Railway and Electric Co.
- DISCHARGE MEASUREMENTS. Made from downstream side of Walnut Street bridge or by wading or from Jefferson Street bridge about one-third mile above. Measurement of overflow from Crystal Spring, which enters river between the two bridges, added when discharge measurements are made at Jefferson Street bridge.
- Channel and Control. Bed composed of coarse gravel and small boulders. Banks may be overflowed at extreme flood stages. Control, loose boulders; shifts slightly.
- Extremes of Discharge. Maximum stage recorded, 14.34 feet August 6, 1901 (discharge 16,900 second-feet.) Minimum stage recorded, 0.0 on morning of December 23, 1909, when flow was retarded by freezing; reported that practically no water was flowing.
- Ice. Ice seldom forms at station, but flow is sometimes retarded by freezing of headwaters.
- Accuracy. Stage-discharge relation changes occasionally. Rating curves fairly well defined for medium and low stages. Records fair.
- Cooperation. Records collected in cooperation with Roanoke Railway and Electric Co.



MEAN WEEKLY DISCHARGE, IN SECOND-

A							Year	EAN W	EEKLY	DISCE	HARGE,	IN SE	COND-
117. 1.						1.74	1 ear						
Week	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908
-											-		
1		81	186	1,406	375	240	1,497	1,078	129	161	1,806		1,349
2		67	120	1,355	196	1,094	432	422	134	333	432		2,533
3		77	339	1,004	748	479	352	315	132	248	377		1,076
4		78	1,013	844	391	311	638	549	20/7	147	1,028		393
5		68	720	1,000	184	226	1,075	742	135	114	609		169
6		1,830	505	2,571	180	325	598	671	265	119	351		385
8		1,023 2,863	316 157	1,437 $2,602$	1,125 904	266 180	270 1,998	2,290 845	182 282	133 385	258 213		487 582
9		498	136	2,691	1,147	178	3,443	981	369	833	257		545
10		219	134	3,008	605	560	951	959	709	1,122	319		467
11		1,711	87	2,671	556	609	927	1,076	310	563	439		455
12		1,036	126	3,127	1,489	304	643	2,291	237	320	755		539
13		4 23	1,112	915	800	844	1,120	2,034	247	290	777		551
14		513	523	581	457	2,146	614	1,234	196	333	490		856
15		417	380	533	338	882	615	1,317	232	376 341	445		435
16		393 315	339 250	377 416	1,286 714	3, Q10 1, 101	486 399	£21 1,220	178 196	236	513 331		359 321
18		1,638	478	340	364	511	337	679	203	174	295		402
19		752	1,366	563	245	619	281	433	243	1,147	255	852	626
20		475	328	448	175	412	249	335	384	1,570	176	436	355
21		393	888	257	443	3,940	218	276	338	425	295	322	600
22		351	331	223	343	1,439	. 177	284	688	402	187	592	308
23		451	168	143	189	775	159	447	371	205	115	603	631
24		368	204	487	436	978	180	366	361	218 491	227	1,319	598 282
26		475 178	426 258	183 296	432 716	1,082 695	170 271	276 651	310 327	324	163 122	491 521	282
27		87	107	157	406	439	155	329	223	870	103	318	757
28	1,051	114	70	114	164	1,155	180	521	208	3,005	91	221	276
29	381	228	219	113	123	1,580	90	235	106	609		192	179
30	282	428	361	130	163	468	96	159	447	535		195	268
31	112	160	815	109	111	319	152	450	363	581		178	160
32	96	277	719	104	86	3,792	92	202	1,136	402		195	155
33 34	89 105	87 133	775 208	130 81	78 82	2,549 1,331	83 79	208 152	299 180	391 313		190 197	152 293
35	86	91	177	108	81	808	76	267	159	890		167	266
36	88	79	437	99	. 80	480	76	231	167	689		149	538
37	73	68	164	79	182	399	77	2,11	131	268		158	223
38	73	140	495	259	145	350	77	1,477	113	206		1,099	154
39	400	501	492	93	- 96	533	82	216	103	155		529	156
40	305	301	832	79	163	442	224	149	86	150		190	125
41	102 92	275 332	548 906	102 90	196 174	255 240	118 94	313 220	92 91	173 140		162 162	309 177
43	91	147	1,980	82	991	202	95	164	94	166		167	1,480
44	91	112	611	183	417	187	121	151	92	146		190	1,123
45	743	90	509	140	236	183	106	201	110	122		171	364
46	430	77	417	97	157	168	159	156	126	121		174	329
47	147	73	648	90	149	210	235	156	115	123		516	666
48	629	70	384	104	1,870	158	692	121	103	127		786	344
49	179 92	167	949	93 242	1,403 404	310	890 384	112 103	148 108	314 183		271 369	388 550
50	115	110 111	388 608	117	273	1,106 510	584 654	140	108	819		169	375
52	98	153	765	251	301	3,799	310	155	122	465		1,213	1,206
	1			201	001	2,.00	0.0						

FEET, OF ROANOKE RIVER AT ROANOKE, VA.

				<i>30</i>			Year								K
1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	Week
1 ,271	346	1,053	392	334	303	1,737	574	425	30	2,522	86	324	320	274	1
93	269	280	245	212	832	1,616	731	286	356	604	94	348	298	230	2
73 783	209 418	168 436	293 289	164 288	378 529	1,035 608	428 322	190 338	571 400	469 581	89 506	617 1,123	475 1,457	285 308	3 4
7 7	202	618	456	390	627	1,774	998	485	306	400	939	773	631	296	
40	274	480	229	239	970	868	721	245	738	329	872	847	551	674	6
530	777	413	206	173	419	541	418	216	1,647	617	278	754	834	492	
489	667	340	788	164	1,494	694	861	601	444	609	278	598	975	390	
705 773	660 507	235 1,067	1,293 641	624 272	584 422	660 660	750 478	1,369 1,860	257 483	925 796	276 492	598 396	1,384 2,334	505 3,408	
468	269	889	3,400	2,198	1,026	569	348	1,007	454	565	389	505	1,277	2,179	
348	208	463	1,054	452	811	469	278	767	785	371	668	389	600	373	
429	153	450	2,634	1,109	619	317	295	621	469	374	389	350	589	230	13
311	184	1,787	1,180	366	727	290	287	662	222	304	900	308	444	198	
1,593	181	1,074	512	557	442	290	578	481	1,473	463	313	253	316	225	
693 439	346 275	786 433	340 271	460 259	614 377	266 252	325 263	328 273	1,409 996	415 321	227 223	267 271	292 278	391 309	
873	216	325	433	182	282	221	222	284	777	658	186	280	572	263	1
502	219	246	1,988	160	260	213	184	449	371	391	228	291	533	203	
334	172	193	2,684	180	197	182	153	253	346	4.63	267	231	1,600		
3,086	223	162	504	1,677	164	159	200	188	972	672	240	162	657	261	
859 666	203 189	162 299	295 232	666	139 135	560 421	140 195	229 146	434 208	361 294	195 362	203 169	640 1,627	168 114	
368	3,456	188	206	233	115	305	235	118	162	606	167	129	403	1,469	
261	842	151	229	311	89	188	248	97	763	333	232	153	273	261	
299	569	164	635	350	89	109	301	97	1,958	1,502	122	130	276	152	
313	441	323	356	658	247	152	159	87	422	297	180	95	366	128	
225	560	254	388	241	522	122	641	113	227	222	137	247	264	145	1
172 134	1,022 286	131 91	334 349	148 126	589 179	125 131	1,875 569	147 460	408 320		115 77	240 196	473 205	119 100	1000
253	213	102	215	108	131	111	464	113	828	459	65	227	146	337	
449	172	111	167	235	123	134	652	84	232	218	100	107	133	261	
239	141	95	141	141	97	146	432	74	380		701	126	111	146	
124	142	69	135	159	99	125	285	68	297	133	551	73	138	150	
107 107	201 279	176 107	123 115	87 108	132 117	242 1,218	220 133	58 67	470 397	116 112	167 92	84 119	122 112	96 274	35
174	150	126	115	57	85	377	123	70	397	94	84	96	100		
129	121	96	157	148	97	209	100	57	548	90	75	107	93	125	
109	115	86	718	116	82	159	136	54	253	84	323	92	76	142	
100	107	80	172	87	99	1,796	107	55	161	79	138	69	89	108	
306	252	102	115	176	100	442	99	60	155	105	86	53	127	108	
144 107	139 148	522 184	115 115	198 267	434 127	369 271	245 140	58 66	144 653	141 113	60	49 49	94 70	97 86	
109	120	117	115	154	96	192	131	113	954	107	58	2,481	57	82	
103	98	270	294	516	89	171	109	63	307	90	62	312	52		45
100	91	243	192	291	226	169	122	56	231	135	396	260	48		46
103	87	216	156	197	161	333	118	60	265	106	196	217	47		47
103 120	100	162	143	225	9 407	178	110	69	344	106	1,085	266 414	62 112	132 404	
40	131 129	136 140	225 211	338 202	2,497 524	164 146	108 103	80 45	252 783	173 462	878	286	103	184	
40	102	555	173	156	721	1,492	148	45	2,569	177	442	196	105	125	
40	197	1,295	217	408	724	895	194	45	912	130	418	310	115	130	52
															1

Monthly Discharge of Roanoke River at Roanoke, Va. [Drainage area, 388 square miles]

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1896					
July 10-31	2,302	91	506	1.30	1.06
August	162	76	98	.254	.29
September	2,140	67	154	.397	.44
October	673	91	142	.366	.42
November	1,435	91	422	1.09	1.22
December	707	91	156	.402	.46
1897 January	91	67	75	.194	.22
February.	8,710	67	1,514	3.90	4.06
March.	2,710	121	796	2.05	2.36
April	610	237	404	1.04	1.16
May	2,905	318	771	1.99	2.29
June	550	87	378	.974	1.09
July	673	78	203	.523	.60
August	550	80	157	.405	.46
September	610	61	190	.490	.54
October	673	109	250	.644	.74
November	109	70	82	.210	.23
December	290	70	132	.340	.39
The year	8,710	61	413	1.06	14.17
1898	1 197	100	454	1 17	1.35
January	1,135 707	109 121	454 350	1.17	.93
February March	1,720	76	318	.820	.94
April.	910	290	466	1.20	.84
May	4,120	85	747	1.93	2.22
June	521	121	270	.696	.7
July	550	67	203	.523	.60
August	1,780	135	570	1.47	1.70
September	2,327	135	381	.982	1.10
October	4,255	290	1,028	2.65	3.00
November	865	347	510	1.31	1.40
December	2,140	318	659	1.70	1.90
The year	4,255	67	496	1.28	16.96
1899	E 409	550	1 104	2.90	3.3
January	5,403 4,255	745	1,124 2,098	2.90 5.41	5.6
February March	4,255 8,508	745	2,098	6.50	7.49
April	785	312	482	1.24	1.38
May		189	377	.972	1.15
June	910	121	278	.717	.80
July	212	91	130	.335	.38
	165	76	105	.271	.31
	745	74	133	.343	.38
August		-	88	.227	.26
September	191	76			
SeptemberOctober	121 290	76 85			
August September October November December	121 290 463	76 85 91	128 173	.330	.30

Monthly Discharge of Roanoke River at Roanoke, Va.—Continued

		Discharges	in Second-fe	et	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1900					
January	3,040	91	403	1.04	1.20
February	3,377	58	639	1.65	1.72
March	3,512	521	964	2.48	2.86
April	2,580	263	687	1.77	1.98
May	1,045	162	320	.825	.951
June	1,230	162	422	1.09	1.22
July	610	114	214	.552	.636
August	121	76	86	.222	.256
September	707	76	123	.317	.354
October	3,918	99	381	.982	1.13
November	8,575	135	593	1.53	1.71
December	3,486	237	576	1.48	1.71
The year	8,575	5.8	451	1.16	15.73
1901					
January	2,972	169	501	1.29	1.49
February	393	116	247	.637	.663
March	2,840	151	531	1.37	1.58
April	11,610	463	1,702	4.39	4.90
May	13,600	376	1,466	3.78	4.36
June	1,804	4,63	885	2.28	2.54
July	3,985	189	859	2.21	2.55
August	16,860	232	1,929	4.96	5.72
September	1,045	263	454	1.17	1.30
October	745	181	267	.688	.793
November	296	151	183	.472	.527
December	13,570	151	1,425	3.67	4.23
The year	16,860	116	870	2.24	30.65
January	4,525	263	781	2.01	2.32
February	11,090	212	1,423	3.67	3.82
March	2,775	347	1,047	2.69	3.10
April	1,090	376	543	1.40	1.56
May	376	181	256	.660	.761
June	318	129	187	.484	.540
July	463	85	143	.369	.425
August	158	76	89	.229	.264
September	85	76	78	.201	.224
October	673	83	134	.345	.398
November	1,045	91	239	.616	.687
December	1,545	189	567	1.46	1.68
The year	11,090	76	457	1.18	15.78

MONTHLY DISCHARGE OF ROANOKE RIVER AT ROANOKE, VA.—Continued

		Discharges in	Second-feet		8 1,17
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1903					
	3,040	237	606	1.56	1.68
January February	8,980	463	1,154	2.97	2.87
March	6,550	580	1,528	3.94	4.54
April	2,972	580	1,190	3.07	3.43
May	785	237	391	1.01	1.16
June	1,545	189	422	1.09	1.22
July	1,000	135	306	.79	.91
August	1,230	109	247	.64	.74
September	6,617	121	531	1.37	1.53
October	785	145	206	.53	.61
November	263	99	162	.42	.47
December	237	73	127	.33	.38
The year	8,980	73	573	1.48	19.54
January	355	43	150	.387	.44
February	550	103	229	.590	.63
March	1,380	212	395	1.02	1.18
April	355	115	202	.521	.58
May	985	196	292	.753	.86
June	1,960	181	417	1.07	1.19
July	1,380	103	264	.680	.78
August	2,390	140	453	1.17	1.35
September	286	103	133	.343	.38
October	103	82	91	.235	.27
November	153	92	111	.286	.31
December	181	92	118	.304	.35
The year	2,390	43	238	.613	8.36
January	800	74	213	.549	.63
February	880	85	259	.668	.69
March.	2,390	224	620	1.60	1.84
April	500	186	316	.814	.90
May	3,877	152	802	2.07	2.39
June	1,390	122	317	.817	.91
July	8,170	152	1,190	3.07	3.54
August	725	205	374	.964	1.11
September	4,633	152	469	1.21	1.35
October	278	122	157	.405	.46
November	152 3,310	101 122	126 425	1.10	.36 1.27
The year	8,170	74	439	1.13	15.48
1906					
January	3,980	310	808	2.08	2.40
February	590	186	299	.771	.80
March	880	186	524	1.35	1.56
April	960	244	459	1.18	1.32
May	360	152	243	.626	.72
June	360	96	161	.415	.46
July 1-15	122	85	99	.255	.14

Monthly Discharge of Roanoke River at Roanoke, Va.—Continued

		Discharges i	n Second-fee	t		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1907						
May 7-13	1,320	251	494	1.27	1.18	
June	3,310	404	768	1.98	2.21	
July	539	178	244	.629	.73	
August	251	162	187	.482	.56	
September	6,550	132	462	1.19	1.33	
October	213	162	173	.446	.51	
November	1,370	162	384	.990	1.10	
December	1,620	251	632	1.63	1.88	
1908						
January	9,380	152	1,230	3.17	3.66	
February	655	152	448	1.15	1.24	
March	590	415	506	1.30	1.50	
April	2,260	224	494	1.27	1.42	
May	1,050	264	478	1.23	1.42	
June	1,600	179	421	1.09	1.22	
July	1,660	169	358	.923	1.06	
August	1,100	117	207	.534	.62	
September	1,660	134	262	.675	.75	
October	6,550	109	647	1.67	1.92	
November	1,140	287	459	1.18	1.32	
December	2,450	244	627	1.62	1.87	
The year	9,380	109	511	1.32	18.00	
1909 January	1,720	376	838	2.16	2.49	
February	1,720	317	531	1.37	1.43	
March	895	279	542	1.40	1.61	
April.	7,630	237	737	1.90	2.12	
May	6,480	279	1,210	3.12	3.60	
June	940	218	413	1.06	1.18	
July	690	110	210	.541	.62	
August	895	86	248	.639	.74	
September	351	86	128	.330	.37	
October	519	75	158	.407	.47	
November	123	86	103	.265	.30	
December	376		108	.278	.35	
The year	7,630		436	1.12	15.25	
1910 January	770	60	250	.644	.7-	
February	3,720	136	506	1.30	1.3	
March.	1,490	151	361	.930	1.0	
April.	488	136	242	.624	.70	
May	326	136	210	.541	.62	
June	7,970	123	1,190	3.07	3 .42	
July	3,240	205	546	1.41	1.63	
August	224	122	163	.420	.48	
September	415	102	175	.451	.50	
October	500	96	158	.407	.4	
November	122	74	96.7	.249	.2	
December	360	85	139	.358	.4:	
The year	7,970	60	334	.861	11.6	

DISCHARGE RECORDS OF

MONTHLY DISCHARGE OF ROANOKE RIVER AT ROANOKE, VA .- Continued

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1911					
January	1,900	166	512	1.32	1.5
February	1,230	237	408	1.05	1.09
March	1,780	200	659	1.70	1.9
April	2,900	376	982	2.53	2.8
May.	403	151	217	.559	.6
June	488	136	199	.513	.5
July	1,030	86	191	.492	.5
August	376	65	107	.276	.3
September	237	82	110	.284	.3
October	2,580	76	213	.549	.6
November	550	110	212	.546	.6
December	1,660	98	535	1.38	1.5
The year	2,580	65	362	.933	12.6
1912 January	770	173	326	0.840	.9
	3, 180	206	622	1.60	1.7
February	7,760	430	1,740	4.48	5.1
March	2,640	242	640	1.65	1.8
April	8,980	282	1,290	3.32	3.8
May	1,230	206	316	.814	3.8
June	550	206	354	.912	
July	242	115	153	.912	1.0
August	2,020	115	266	.686	
September October	2,020	115	128	.330	.7
	550	115	189	.330	
November	490	115	203	.523	.5
The year	8,980	115	520	1.34	18.2
1913	4 400	140			
January	1,130	143	271	0.698	0.8
February	1,540	143	266	.686	.7
March	7,900	242	965	2.49	2.8
April	1,230	206	408	1.05	1.1
May	5,200	143	604	1.56	1.8
June	850	143	312	.804	.9
July	1,440	102	281	.724	.8
August	620	89	151	.389	.4
September	300	50	106	.273	.3
October	490	77	181	.466	.5
November	1,660	115	277	.714	.8
December	940	143	290	.747	.8
The year	7,900	50	344	.887	12.0

Monthly Discharge of Roanoke River at Roanoke, Va.—Continued

		Discharges i	in Second-fee	et		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1914					3 4	
January	1,900	242	505	1.30	1.50	
February	2,520	282	900	2.32	2.42	
March	1,330	375	674	1.74	2.01	
April	1,330	282	558	1.44	1.61	
May	282	143	213	.549	.63	
June	143	89	110	.283	.31	
July	1,660	89	358	.923	1.06	
August	173	43	117	.302	.35	
September	173	65	95.2	.245	.27	
October	1,330	65	182	.469	.54	
November	490	89	145	.374	.42	
December	10,200	282	1,110	2.86	3.30	
The year	10,200	* 43	412	1.06	14.42	
1915	7					
January	8,300	450	1,180	3.04	3.51	
February	5,880	• 392	1,000	2.58	2.69	
March	793	290	512	1.32	1.52	
April	290	211	269	.693	.77	
May	512	146	210	.541	.62	
June	1,250	85	324	.835	.93	
July	248	85	128	.330	.38	
August	381	70	149	.384	.44	
September	2,290	146	475	1.22	1.36	
October	6,820	204	669	1.72	1.98	
November	512	155	212	.546	.61	
December	4,660	61	649	1.67	1.92	
The year	8,300	61	481	1.24	16.73	
January	870	269	504	1.30	1.50	
February	4,120	290	812	2.09	2.25	
March	578	256	378	.974	1.12	
April	756	237	355	.915	1.02	
May	290	137	183	.472	.54	
June	545	123	236	.608	.68	
July	4,660	112	759	1.96	2.26	
August	1,130	158	433	1.12	1.29	
September	235	86	125	.322	.36	
October	618	93	147	.379	.44	
November	142	-98	117	.302	.34	
December	326	48	138	.356	.41	
The year	4,660	48	349	.900	12.21	

MONTHLY DISCHARGE OF ROANOKE RIVER AT ROANOKE. VA .- Continued

		Discharges in	Second-feet	5	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1917	5		* +		
January	850	158	334	0.861	.99
February	1,230	75	396	1.02	1 06
March	5,870	459	1,240	3.19	3.68
April	1,440	248	432	1.11	1.24
May	584	151	291	.750	.86
	227	82	120	.309	.34
June					
July	690	71	194	.500	.58
August	106	46	76.6	.197	.23
September	82	53	62.5	.161	.18
October	184	52	66.8	.172	.20
November	142	49	65.3	.168	.19
December	148		55.2	.142	.16
The year	5,870	46	278	.715	9.71
1918				000	1.00
January			345	.889	1.02
February	2,900	142	772	1.99	2.07
March	1,360	206	514	1.32	1.52
April	3,180	172	990	2.55	2.84
May	3,440	289	607	1.56	1.80
June	7,630	130	677	1.74	1.94
July	2,130	156	400	1.03	1.19
August	2,770	172	442	1.14	1.31
September	1,100	192	391	1.01	1.13
October	2,510	124	373	.961	1.11
November	1,050	195	340	.876	.98
December	6,960	188	1,070	2.76	3.18
The year	7,630	124	577	1.49	20.09
January	8,170	389	986	2.54	2.93
February		281	572	1.47	1.53
March	1,310	314	556	1.43	1.65
April	860	265	372	.959	1.07
May		293	534	1.38	1.59
June	3,180	242	655	1.69	1.89
July	1,590	202	464	1.20	1.38
August	1,150	116	227	.585	.67
September		77	96.3	.248	.28
October	159	67	109	.246	.32
November	156	87	110	.284	.32
December	1,050	89	223	.284	.66
The year	8,170	67	409	1.05	14.29

MONTHLY DISCHARGE OF ROANOKE RIVER AT ROANOKE, VA.—Continued

		Discharges	in Second-fee	t		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1920				1.4		
January	1,200		203	.523	.60	
February	5,060	198	584	1.51	1.63	
March		223	439	1.13	1.30	
April	1,420	192	426	1.10	1.23	
May	339	162	230	.593	.68	
June	690	101	219	.564	.63	
July	242	55	122	.314	.36	
August	3,580	55	346	.892	1.03	
September	507	62	142	.366	.41	
October	169	58	83.6	.215	.25	
November	2,250	56	322	.830	.93	
December	1,650	335	614	1.58	1.82	
The year	5,060	55	311	.801	10.87	
1921						
January	1,530	281	623	1.61	1.86	
February	1,650	445	726	1.87	1.95	
March	860	322	432	1.11	1.28	
April	389	206	276	.711	.79	
May	445	156	238	.613	.71	
June	223	106	150	.387	.43	
July	541	87	203	.523	.60	
August	242	66	107	.276	.32	
September	206	66	104	.268	.30	
October	1,890	48	117	.302	.35	
November	12,500	177	725	1.87	2.09	
December	522	162	290	.747	.86	
The year	12,500	48	333	.857	11.54	
1922 January	2,770	228	609	1.57	1.81	
February	1,310	491	755	1.95	2.03	
March	5,200	433	1,300	3.35	3.86	
April	554	247	326	.840	.94	
May	3,980	267	780	2.01	2.32	
June	4,930	228	682	1.76	1.96	
July	624	120	304	.784	.90	
August	210	97	126	.325	.37	
September	120	77	96.3	.248	.28	
October	162	61	91	.235	.27	
November	59	48	52.4	.135	.15	
December	247	87	106	.273	.31	
The year	5,200	48	436	1.12	15.20	

MONTHLY DISCHARGE OF ROANOKE RIVER AT ROANOKE, VA. - Continued

		Discharges in	Second-fee	t ·	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1923					
January	310	210	263	.678	.78
February	789	267	469	1.21	1.26
March	6,680	210	1,450	3.74	4.31
April	433	177	267	.688	.77
May	332	156	223	.575	.66
June	3,040	97	468	1.21	1.35
July	177	97	121	.312	.36
August	522	87	199	.513	.59
September	462	87	162	.418	.47
October	108	83	98.3	.253	.29
November	177	77	90.6	.234	.26
December	837	113	200	.515	.59
The year	6,680	77	334	.863	11.69

ROANOKE RIVER AT RANDOLPH, VA.

LOCATION. At railroad bridge five-eighths mile southwest of Southern Railway station at Randolph, Charlotte County.

Drainage Area. 3,076 square miles.

RECORDS AVAILABLE. August 27, 1900 to August 11, 1906, when station was discontinued.

Gage. Wire gage used to May 20, 1903, chain gage thereafter; read once daily by J. E. Figg. Datum changed during summer 1902, and on October 13, 1902.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL. Channel straight for considerable distance above and below station. Bed mainly of firm material. Control changed occasionally.

Extremes of Discharge. Maximum stage recorded, 32.0 feet December 30, 1901 (discharge, 75,100 second-feet); minimum stage recorded, 2.5 feet October 18, 1904 (discharge, 590 second-feet).

ICE. River frozen over January 28 to February 21, 1905. No correction made in estimates.

Accuracy. Stage-discharge relation changed several times. Rating curves fairly well defined for medium and low stages. Records fair.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF ROANOKE RIVER AT RANDOLPH, VA.

	Year											
Week	1900	1901	1902	1903	1904	1905	1906					
1		2,810	8,760	11,013	2,100	2,371	12,909					
2		12,150	3,584	4,296	1,952	5,404	3,836					
3		4,371	3,057	3,196	2,035	2,634	3,103					
4	-5	3,174	5,586	5,233	2,461	1,363	3,487					
5		2,963	10,591	6,300	1,816		7,509					
6		3,454	4,084	6,356	4,023		3,387					
7		2,961	3,124	15,894	2,721		2,917					
8		2,574	8,801	6,870	5,549		2,274					
9		2,480	31,276	8,293	2,889	6,793	2,497					
10		2,631	7,198	5,574	3,070	5,415	2,880					
11		4,111	6,861	5,614	3,210	6,604	3,193					
12		3,079	4,680	22,545	2,667	2,914	5,991					
13		7,030	6,378	10,983	2,171	23,139	6,030					
14		14,449	4,881	7,494	2,054	3,189	3,609					
15		6,005	5,497	8,411	2,066	2,992	4,954					
16		12,877	3,623	5,692	1,941	2,589	4,266					
17		6,759	3,419	5,764	3,436	2,734	2,927					
18		3,735	3,972	4,354	2,544	1,813	1,966					
19		4,282	3,592	3,424	3,169	4,207	2,576					
20		3,151	2,954	2,933	3,695	6,015	1,949					
		20,003	3,063	2,910	2,609	3,084	1,537					
23		7,563	2,456	3,654	4,904	4,328 1,848	3,540 2,434					
		4,361	2,278	5, 021 3, 634	2,913 2,508		2,434					
24		4,227 5,329	6,701	2,590	2,308	1,321 2,494	3,401					
26		5,076	3,399 2,899	5,691	3,354	5,775	3,636					
27		3,850	2,699	3,209	2,274	8,021	2,113					
28		6,889	2,338	2,396	1,371	10,947	2,413					
29		11,796	1,748	2,390	1,094	4, 194	1,980					
30		3,704	1,702	1,709	3,084	4,168	2,246					
31		2,834	2,376	$\frac{1,700}{2,259}$	3,794	2,368	4,136					
32		18,316	2,293	2,087	4,704	4,059	4,100					
33		18,680	2,665	2,430	1,621	4,335						
34		7,620	1,670	2,510	2,033	2,255						
35		12,504	1,736	5,217	2,375	2,322						
36	1,349	3,899	1,997	2,213	2,069	8,203						
37	2,244	3,231	1,766	2,460	2,714	1,921						
38	2,396	4,654	1,664	5,377	1,465	1,602						
39	1,675	3,892	2,038	1,997	825	1,137						
40	1,616	3,748	11,904	1,766	865	1,185						
41	1,620	3,918	4,373	3,181	755	1,930						
42	1,751	3,135	1,977	2,259	748	1,703						
43	5,417	2,820	2,002	1,792	795	1,379						
44	2,598	2,795	2,167	1,806	775	1,255						
45	2,818	2,765	1,659	2,134	1,117	1,250						
46	2,150	2,770	1,454	1,675	1,910	1,285						
47	2,050	3,389	2,544	1,784	1,018	1,295						
48	4,904	3,076	6,420	1,654	1,124	1,497						
49	7,062	3,913	9,477	1,772	1,609	2,634						
50	3,034	7,625	3,396	1,749	2,044	2,237						
51	2,688	5,049	5,279	2,133	1,793	2,810						
52	3,367	22,061	2,999	2,170	2,189	11,203						

Monthly Discharge of Roanoke River at Randolph, Va. [Drainage area, 3,076 square miles]

	1	t			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inche
1900					
September	8,625	1,120	1,878	0.61	0.6
October	17,900	1,350	2,597	.84	.9
November	13, 100	2,025	2,938	.96	1.0
December	18,600	2,550	3,944	1.28	1.4
1901	05 000	0.550	7 000	1.74	0.0
January	35,980	2,550	5,362	1.74	2.0
February	3,860	2,410	2,948	.98	1.0
March	14,850	2,340 3,580	4,000	1.30 3.13	1.5
April	36,910 37,940	2,980	9,620 8,148	2.65	3.4
May	1	3,140		1.55	1.7
June	9,750	2,690	4,759 6,259	2 03	2.3
July	30,980 45,100	2,620	13,185	4.29	4.9
August September	6,955	2,620	3,998	1.30	1.4
October	6,725	2,795	3,346	1.09	1.4
November	5, 260	2,795	2,984	.97	1.0
December	75, 100	2,830	9,621	3.13	3.6
	75,100	2,340	6,186	2.01	
The year	75,100	2,340	0,100	2.01	27.5
January	26,200	2,800	5,388	1.75	2.02
February	51,050	2,880	10,290	3.35	3.4
March	40,500	3,600	8,616	2.80	3.2
April	10, 120	3,040	4,398	1.43	1.6
May	4,950	2,400	3,250	1.06	1.2
June	24,450	2,070	3,656	1.19	1.3
July	3,440	1,580	2,149	.70	.8
August	5,370	1,580	2,198	.71	.8
September	2,720	1,535	1,844	.60	.6
October	38,150	1,435	4,845	1.58	1.8
November	8,600	1,370	2,551	.83	.9
December	14,550	2,270	5,349	1.74	2.0
The year	51,050	1,370	4,545	1.48	19.9
January	23,850	2,590	6,123	1.99	2.2
February	44,200	3,710	8,575	2.79	2.9
March	44,550	3,915	11,010	3.58	4.1
April	14,050	4,320	7,041	2.29	2.5
May	4,500	2,590	3,370	1.10	1.2
June	9,200	2,430	4,147	1.35	1.5
July	4,950	1,500	2,445	.79	.9
August	9,680	1,310	2,712	.88	1.0
September	13,420	1,570	3,273	1.06	1.1
October	4,410	1,500	2,191	.71	.8
November	2,510	1,500	1,841	.60	.6
December	2,430	1,570	1,940	.63	.7
The year	44,550	1,310	4,556	1.48	19.9

MONTHLY DISCHARGE OF ROANOKE RIVER AT RANDOLPH, VA .- Continued

	1	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-eff in Inches
1904					
January	2,860	1,540	2,087	0.678	0.782
February	7,810	1,620	3,667	1.19	1.28
March	3,770	2,020	2,787	.906	1.04
April	4,435	1,540	2,224	.723	.807
May	5,720	1,540	2,939	.955	1.10
June	9,750	2,265	3,397	1.10	1.23
July	5,420	725	2,117	.668	.793
August	6,760	1,305	2,899	.942	1.09
September	3,770	725	1,801	.586	.654
October	1,230	590	787	.256	.295
November	2,435	725	889	.289	.322
December	2,690	1,230	1,881	.612	.706
The year	9,750	590	2,290	.744	10.10
1905					
January	10,530	1,050	2,773	0.901	1.04
February (22-28)	9,585	7,470	8.497	2.76	.718
March	9,010	1,950	4,601	1.50	1.73
April	5,380	1,555	2,576	.837	.934
May	9,470	1,630	3,974	1.29	1.49
June	9,470	1,260	2,891	.940	1.05
July	28,960	2,508	6,485	2.11	2.43
August	5,750	1,710	3,083	1.00	1.15
September	23,940	1,030	3,213	1.04	1.16
October	3,335	1,120	1,528	.497	.573
November	1,518	1,155	1,292	.420	.469
December	29,740	1,592	4,733	1.54	1.78
1906		2 110			
January	35, 200	2,440	6,200	2.01	2.32
February	8,860	2,000	3,220	1.05	1.09
March	14,000	2,620	4,210	1.37	1.58
April	6,910	2,120	3,980	1.29	1.44
May	5,860	1,300	2,300	.747	.86
June	6,360	2,080	2,880	.935	1.04
July	4,650	1,540	2,360	.766	.88
August 1-11	5,420	3,320	4,020	1.31	.54

ROANOKE RIVER AT OLD GASTON, N. C.

LOCATION. At bridge of Roanoke Railway Co., at Old Gaston, Northampton County, about three-fourths mile below mouth of Indian Creek, 11/4 miles north of Thelma, 2½ miles above mouth of Deep Creek, and 5½ miles above mouth of Roanoke Rapids Canal.

Drainage Area. 8,350 square miles.

Records Available. December 7, 1911 to December 31, 1923.

Gage. Prior to November 21, 1921, R. A. Howell read a chain gage attached to outside guard timber on downstream side of second span from right end of deck railroad bridge. On November 21, 1921 a Friez automatic recording gage was installed in a timber well and shelter, attached to downstream end of second masonry pier from right end of railroad bridge, near chain gage. Recorder set to read with chain gage. No change in gage datum.

DISCHARGE MEASUREMENTS. Made from downstream side of bridge to which gage is attached. Measuring section broken by 11 bridge piers.

CHANNEL AND CONTROL. Channel fairly permanent. Control, about 1 mile below gage, is of rocks and probably permanent. Left bank subject to overflow in extreme floods but a fair determination can be made of the overflow discharge around bridge.

Extremes of Discharge. Maximum stage recorded, 16.6 feet at 7 a.m. March 18, 1912 (discharge, 210,000 second-feet); minimum stage recorded, 0.95 foot at 6 a.m. October 1, 1914 (discharge, 790 second-feet).

ICE. Ice formed to considerable thickness at this station during winter of 1917-18, and the stage-discharge relation was seriously affected.

TION. Recorder hydrographs show slight daily fluctuations, probably

caused by operation of power plants many miles upstream.

Accuracy. Stage-discharge relation permanent. Rating curve well defined below 100,000 second-feet and fairly well defined to 200,000 second-feet. Operation of water-stage recorder fairly satisfactory. Prior to November 21, 1921, gage read to tenths once daily.*

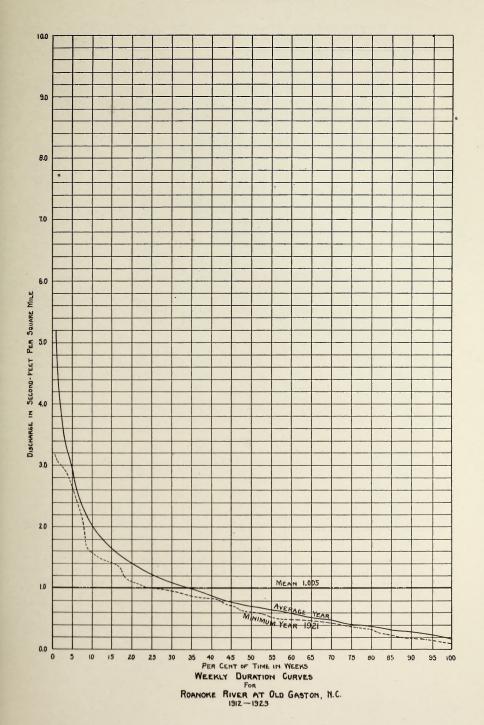
gage read to tenths once daily.*

Cooperation. November 21, 1921 to 1923, this station was operated for Federal Power Commission Project No. 7. The permittees, the Roanoke Development Company, paid all field expenses attached to installation and operation of the recorder equipment and also for field expenses of engineers making discharge measurements. The Virginia Railway and Power Company has continued paying observer for one daily reading of chain gage.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF ROANOKE RIVER AT OLD GASTON, N. C.

			-				Year	•					
Week		1	1	1	1	1	1	1	1	1	1	1	1
	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
1		9,494		21,629			7,010		40,604				11,306
2		4,854	4,726		46,371	9,231	7,651	6,964			22,600		
3		5,609			25,086		9,311		10,320		24,800		
4		7,500	8,997		13,309		8,521		12,876		13,600		
5		12,796 5,143		9,461 15,963	24,026			24,714 15,743		16,201 36,460			
		6,211	4,210	9,053	8,853		4,647						17,329
8		18,312		25,409	8,943	6,483	8,713		13,033		19,214		
9				11,080			25,009		20,129				13,734
10		14,717	5,563	8,909	13,089		47,243	8,111	22,929	9,224			19,563
11			54,449	13,371	9,211	5,407	11,746			12,876			32,514
12		33,444			7,814		20,614			16,976			33,786
13		44,287		8,966	5,571		17,647		8,067				10,106
14		14,380		9,024	9,831		16,560			19,530		10,549	
15			18, 104	7,594	8,576			30,587		12,046	6,917		15,509
16		10, 267	12,013 5,883	8,031	6,424 4,859	4,524 4,416		16,964 34,429	9,784 7,343	7,254 9,659	12,180 $7,177$		12,477
18		8,901	4,744	5,486	4,480	4,296		12,294	9,267	6,306	6,254	6,423 8,257	6,960 10,383
19		12,953	3,697	6,736	5,381	5,429	8,946		12,109	5,791		12,186	5,509
20		41,643	4,216	5,290	4,619	3,960		12,430		5,007	13,023		5,529
21		8,916	21,484	3,484	2,989	14,723	2,701	7,417	11,990	4,791		15,486	4,763
22		5,823	12,996	3,520	12,660	8,830	4,546	6,419	10,191	3,426	7,403	7,014	4,471
23		5,571	6,970		24,099		6,491		14,894	11,484	7,937	16,714	3,410
24		5,126	6,251	2,557		13,923	16,824		10,650	3,854	3,814	6,503	6,431
25		5,859	4,628	2,429		13,423	3,626	3,173	4,603	6,924		12,563	4,010
26		8,826	9,827	4,064	2,494	6,020	4,456	8,623		7,447	4,360	5,320	2,894
27		9,229 5,101	9,429 4,893	7,049 4,890	3,346 3,540	6,333 5,001	4,936 4,160	3,433 3,410	7,197 $5,374$	3,053 6,324	5,036 4,539	6,849	2,466 4,806
29		4,069	3,833	12,801		11,747	7,740	5,490		7,796		16,857	4,460
30		3,417	2,904	2,643			20, 171	4,129		4,733	2,851	7,757	3,157
31		2,520	5,677	3,784	5,766	9,584	5,954		11,636	2,127	5,367		14,594
32		2,559	4,549	2,859	5,807	10,281	3,280	2,279	5,637	5,899	2,247	4,329	7,374
33		2,083	5,399	1,977	15,584	7,310	2,309	3,953	8,516	9,837	1,907	7,366	5,214
34		1,907	3,246	1,551	8,029	6,064	2,299	5,859	4,696		1,484	4,099	6,697
35		1,890	4,034		17,324	3,636	4,191	4,363	2,473	5,890	921	5,873	3,846
36		1,687	15,004 $2,721$	1,884	17,923 $6,429$	2,977 1,783	8,994 4,933	4,071 4,163	2,776 1,866	3,414 3,743	1,147 3,809	4,404 3,476	7,070 7,249
38		3,409	3,156	1,034	3,376	2,544	1,823	4,290	1,900	1,813	1,584	2,626	5,330
39		12,020	4,654	1,339	2,643	2,121	1,949	3,907	2,371	5, 103	3,009		14,220
40		2,960	2,054	956	17,817	3,100	1,716	2,216	1,514	6,774	2,211	1,929	3,047
41		2,181	4,280	2,586	12,350	2,810	2,621	1,240	1,591	2,224	1,573	9,577	2,400
42		2,754	3,323	8,436	4,764	4,254	2,269	1,490	5,266	1,833	1,413	5,654	2,300
43			14,754	2,621	5,906	5,916	2,531	1,773	4,241	1,911	1,177	3,519	2,933
44		2,520	5,384	2,104	3,433	2,454	6,454	7,936	2,870	2,256	8,157	2,931	2,703
45			14,324	2,186 5,469	2,883 2,869	2,553 3,070	2,620 1,947	4,053 2,927	2,380	2,290 10,290	4,066	2,761	4,983
46		3,067	11,880 5,350	4,517	7,141	2,261	2,379	6,801		10,290	3,449 4,133	2,954 3,037	3,406 3,016
48		2,796		2,577	2,769	2,266	3,516	6,397		30,371	3,746	2,620	3,429
49			11,116		3,516	2,610	3,966	5,746		20,900	4,866		10,690
50				10,291	2,724	4,130	1,187	3,680		ي1,100	3,169	4,091	5,374
51		3,046				3,067		16,716		10,803	3,237	7,151	4,741
52	21,585	3,963	11,200	20,150	11,079	5,694	1,075	$20,266^{l}$	2,285	11,675	3,972	5,800	4,820

^{*} Revised rating from 1925 low water measurements, increases minimun flow slighty.



Monthly Discharge of Roanoke River at Old Gaston, N. C. [Drainage area, 8,350 square miles]

	1	-			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1912					
January	21,400	4,000	7,380	.884	1.02
February	50,300	3,740	14,600	1.75	1.89
March	210,000	8,420	38,000	4.55	5.25
April.	68,700	7,010	12,400	1.49	1.66
May	78,000	5,500	16,900	2.02	2.33
	15,000	3,910	6,110	.732	.82
June	16,200			.651	
July		2,020	5,440		.75
August	3,580	1,250	2,200	.263	.30
September	27,400	790	4,460	.534	.60
October	3,580	1,500	2,610	.313	.36
November	36,000	2,160	5,290	.634	.71
December	5,140	2,620	3,590	.430	.50
The year	210,000	790	9,920	1.19	16.19
1913					
January	25,100	3,410	7,240	.867	1.00
February	9,960	3,410	5,010	.600	.62
March.	117,000	4,080	20,300	2.43	2.80
April	53,300	4,430	11,200	1.34	1.50
May	49,300	3,250	9,700	1.16	1.34
June	13,000	3,410	6,890	.825	.92
July	18,500	2,160	5,230	.626	.72
August	10,900	2,020	4,320	.517	.60
September	29,000	1,620	6,390	.765	.85
October	22,100	1,250	6,150	.737	.85
November	51,300	2,770	8,310	.995	1.11
December	22,100	3,410	7,620	.913	1.05
The year	117,000	1,250	8,220	.984	13.36
January	45,400	4,430	10,100	1.21	1.40
February	44,400	7,400	15,300	1.83	1.91
March	16,600	8,210	11,000	1.32	1.52
April	16,600	5,870	9,010	1.08	1.20
May	9,500	2,930	4,930	.590	.68
June	7,00	1,750	2,980	.357	.40
July	27,400	1,370	6,640	.795	.92
August		1,250	2,370	.284	.33
September	3,090	900	1,480	.177	.20
October	21,400	790	3,540	.424	.49
November	11,900	1,250	3,540	.424	.47
December	40,600	2,020	13,700	1.64	1.89
The year	45,400	790	7,049	0.844	11.41

MONTHLY DISCHARGE OF ROANOKE RIVER AT OLD GASTON, N. C.—Continued

]	Discharges in	Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1915					
January	72,300	9,060	23,400	2.80	3.23
February	57,500	4,780	16,500	1.98	2.06
March	17,900	4,080	9,140	1.09	1.26
April	13,000	4,430	7,260	.870	.97
May	7,400	900	4,400	.527	.61
June	60,800	1,750	10,500	1.26	1.41
July	6,240	2,020	3,300	.395	.46
August	38,800	2,160	10,500	1.26	1.45
September	28,200	2,160	8,120	.973	1.09
October	40,600	3,000	9,600	1.15	1.33
November	14,700	1,240	3,810	.456	.51
December	40,600	1,600	7,880	.944	1.09
The year	72,300	900	9,534	1.14	15.47
January	38,800	3,470	8,890	1.06	1.22
February	68,000	5,340	14,800	1.77	1.22
March	9,960	3,160	6,100	.731	.84
April.	14,700	3,160	6,560	.786	.88
May	41,600	2,110	7,400	.886	1.02
June	53,300	3,160	11,000	1.32	1.02
July	36,900	1,850	11,100	1.33	1.53
August	15,900	3,310	7,470	.895	1.03
September.	3,470	900	2,440	.292	.33
October	14,700	1,360	3,890	.466	.54
November	3,630	1,360	2,490	.298	.33
December	6,470	1,480	3,870	.463	.53
The year	68,000	900	7,168	.857	11.63
1917					
January	15,300	4,460	8,530	1.02	1.18
February	16,600	3,470	7,760	.929	.97
March	77,100	7,280	26,200	3.14	3.62
April.	39,700	3,470	9,790	1.17	1.30
May	10,400	1,600	5,680	.680	.78
June	35,100	2,390	7,590	.909	1.01
July	25,100	3,310	8,970	1.07	1.23
August	9,490	1,360	3,050	.365	.42
September	14,200	900	4,710	.564	.63
October	8,210	900	2,530	.303	.35
November	11,900	1,370	3,180	.381	.43
December	6,620	900	2,190	.262	.30
The year	77,100	900	7,515	.899	12.22

MONTHLY DISCHARGE OF ROANOKE RIVER AT OLD GASTON, N. C.-Continued

		t			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1918					
January	38,800	900	9,070	1.090	1.20
February	32,400	5,140	12,100	1.450	1.51
March	10,400	4,430	6,930	.830	.96
April	72,300	4,430	21,100	2.530	2.82
May	24,300	3,740	9,280	1.110	1.28
June	13,000	1,880	4,660	.558	. 62
July	11,400	2,160	4,210	.504	.58
August	9,500	1,370	4,560	.546	.63
September	9,960	1,370	4,150	.497	.55
October	10,400	900	2,250	.269	.31
November	14,700	2,160	5,110	.612	.68
December	42,500	2,770	11,800	1.410	1.63
The year	72,300	900	7,935	.951	12.83
1919	01.700	4 700	17 500	0.10	0.4
January	91,700	4,780	.17,500	2.10	2.49
February	23,600	5,500	10,200	1.22	1.27
April	47,300	5,500	14,400	1.72	1.98
May	19,900	3,740	8,420	1.01	1.15
June	26,600 45,400	4,780 3,410	11,300 12,700	1.35	1.56
July	110,000	3,410	25,500	1.52 3.05	3.52
August	22,800	1,370	6,750	.808	.98
September	4,080	1,370	2,340	.380	.31
October	7,010	1,370	3,180	.381	.44
November	7,800	1,880	3,140	.376	.45
December	13,600	1,880	4,160	498	.57
The year	110,000	1,370	8,966	1 .201	16.25
January	13,600	1,370	4,710	.564	.68
February	75,400	5,500	16,200	1.940	2.09
March	28,200	4,430	11,200	1.340	1.54
April	34,200	6,240	12,000	1.440	1.61
May	9,060	3,410	5,110	.612	.71
June	25,100	2,460	7,100	.850	.95
July	12,500	2,160	5,220	.625	.72
August	37,800	1,880	9,020	1.080	1.24
September	7,010	1,370	3,570	.428	.48
October	11,000	1,340	3,089	.369	.43
November	52,100	1,830	9,560	1.140	1.27
December	59,700	7,080	18,400	2.200	2.54
The year	75,400	1,340	8,765	1.049	14.23

MONTHLY DISCHARGE OF ROANOKE RIVER AT OLD GASTON, N. C .- Continued

		Discharges in	n Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1921				1-1-1	
	51,100	5,560	16,300	1.950	2.25
January	55,300	8,000	17,200	2.060	2.14
	12,500	6,280	8,310	.995	1.15
MarchApril	23,500	5,200	8,570	1.030	1.15
May	32,200	4,520	8,300	.994	1.15
	11,500				.68
June	9,000	2,930	5,110	.612	.62
July		2,090 890	4,500	.539	.34
August	11,000	. 7	2,430	.291	
September	9,500	890	2,290	.274	.31
October	2,930	890	1,570	.188	.22
November	31,300	1,580	5,060	.606	.68
December	5,920	2,780	3,860	.462	.53
The year	55,300	890	6,954	.833	11.27
January	15,900	2,360	6,140	.735	.85
February	49,100	7,540	21,800	2.61	2.72
March.	69,400	7,540	23,700	2.84	3.27
April	14,700	5,560	7,930	.95	1.06
May	46,100	5,920	13,200	1.58	1.82
June	26,500	4,180	10,000	1.20	1.34
July	37,400	5,200	10,500	1.26	1.45
August	11,500	2,930	5,340	.64	.74
September	6,660	1,960	3,160	.378	.42
October	22,000	1,580	4,950	.593	.68
November	3,380	2,360	2,880	.345	.38
December	9,500	2,500	4,900	.587	.68
The year	69,400	1,580	9,540	1.14	15.41
1923 January	19,200	4,180	8,930	1.07	1.23
February	25,000	5,560	13,000	1.56	1.62
March	113,000	7,540	26,800	3.21	3.70
April	35,600	5,920	11,200	1.34	1.50
May	15,300	4,180	5,920	.709	.82
June	10,000	2,640	4,300	.515	.57
July	7,540	2,040	3,890	.466	.54
August	29,700	3,230	7,850	.940	1.08
September	29,700	2,360	8,150	.976	1.00
October	3,860	2,300	2,680	.321	.37
November.	8,000	2,220	3,570	.428	.48
December	27,300	3,380	6,180	.740	.85
December	21,000	9,000	0,100	011.	
The year	113,000	2,090	8.540	1.02	13,85

ROANOKE RIVER AT NEAL, N. C.

LOCATION. At the Norfolk and Carolina Railroad bridge at Neal, Bertie County, near Kelford, N. C.
DRAINAGE AREA. 8,717 square miles.
RECORDS AVAILABLE. July 27, 1896 to May 31, 1903, when station was discontinued.

GAGE. Wire gage fastened to railroad bridge; read by W. M. Adams.

DISCHARGE MEASURMENTS. Made from bridge to which gage is attached.
CHANNEL AND CONTROL. Bed of stream muddy; shifting. Channel straight for a long distance above and 600 feet below station. Control not known. Both banks subject to overflow.

Extremes of Discharge. Maximum stage recorded, 30.4 feet May 26, 1901 (discharge, 85,200 second-feet); minimum stage recorded, 0.0 foot September 21 and 22, 1897 (discharge, 2,000 second-feet).

ICE. Stage-discharge relation not affected by ice.

Regulation. Slight regulation at Roanoke Rapids and power plants on Dan River.

Accuracy. Stage-discharge relation affected by variation in slope with rate of change in stage; otherwise fairly permanent. Rating curves fairly well defined for medium and low stages. Records for those stages, fair; high water records, poor water records, poor.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF ROANOKE RIVER AT NEAL, N. C.

				Y	ear			
Week	1896	1897	1898	1899	1900	1901	1902	1903
1		3,550	4,201	10,106	3,020	6,122	53,026	27,697
2		3,293	3,466	38,881	8,064	7,885	13,959	30,806
3		3,414	3,453	19,487	14,586	21,715	7,376	11,679
4		8,255	5,253	10,457	23,032	6,648	14,151	14,119
5		6,899	6,772	8,855	7,296	5,034	20,236	17,021
6		33,940	3,378	37,187	9,116	5,627	27,971	29,631
7		24,872	3,358	19,796	24,317	6,275	9,681	30,464
8		25,075	3,243	45,350	19,182	4,315	12,831	54,787
9		38,946	3,099	28,357	23,192	3,755	54,286	26,901
10		21,514	5,154	.38,623	24,437	3,530	35,219	21,181
11		33,113	3,629	26,866	14,679	5,992	14,828	19,902
12		23,036	3,134	61,999	14,238	4,559	17,867	30,907
13		9,275	3,968	26,880	13,025	28,577	14,451	61,868
14		7,556	11,105	16,647	8,999	39,625	15,074	38,199
15		15,306	7,081	24,606	7,384	19,170	19,168	35,795
16		6,953	4,984	12,214	17,789	17,260	10,350	33,059
17		4,727	4,687	9,583	31,646	25,606	7,568	27,139
18		8,404	3,768	8,986	10,222	8,791	9,608	20,390
19		6,494	20,269	9,351	6,227	9,586	9,138	10,885
21		14,589	9,551	9,526	4,807	7,453	7,313	8,175
22		6,084	15,272	6,320	7,305	41,469	6,980	6,995
23		5,398	12,899	7,376	7,355	36,328	5,159	
24		4,369	3,387	7,247	4,280	10,244	3,950	
25		3,765 5,282	2,948	19,436	5,179	6,270	3,700	
26		3,494	10,849 3,315	10,809 5,629	11,382	12,927	18,028	
27		3,581	2,845	5,363	10,601	10,043	5,341	
28		3,769	3,702	7,291	5,196 -3,300	7,576	4,956	
		3,997	4,225	4,220	2,634	6,969	5,019	
30		4,786	4,129	6,136	7,091	38,544 14,187	3,130 2,705	
31		2,811	4,637	6,866	6,232	5,255	3,774	
32	2,940	2,584	3,712	5,052	2,253	30,449	3,590	
33	3,340	2,651	7,634	6,730	1,671	46,239	3,090	
34	3,103	2,857	4,251	4,333	1,774	34,113	4,032	
35	2,822	2,669	3,548	7,367	2,380	30, 186	3,270	
86	3,239	2,603	3,713	4,863	1,764	12,214	4,268	
37	3,290	2,064	3,672	4,710	1,543	5,810	4,494	
88	3,214	2,006	2,147	5,694	5,226	14,062	2,861	
39	3,309	2,126	23,579	6,014	2,519	7,031	3,379	
10	26,760	2,071	6,156	3,790	2,358	10,768	7,526	
11	6,149	2,017	6,545	7,326	3,022	5,475	25,219	
12	3,231	3,003	3,221	4,070	3,111	6,524	11,861	,
13	2,950	2,970	17,709	3,510	5,807	4,491	4,249	
14	2,951	3,135	12,479	6,856	4,560	4,245	7,103	- 4
15	12,614	3,860	5,221	9,306	6,106	4,235	4,718	
16	5,062	2,465	3,906	4,550	3,285	4,165	4,362	
17	3,563	2,366	6,409	4,020	2,805	4,214	8,434	
8	5,068	5,019	5,470	4,330	6,427	6,156	11,189	
19	12,416	5,225	14, 164	4,285	11,834	6,413	30,409	
50	5,384	3,633	7,725	6,226	6,749	6,616	14,961	
51 52 62 63	7,990	4,484	4,524	5,744	4,095	21,893	16,352	
14	3,832	7,703	10,274	6,236	6,025	25,874	13,959	

MONTHLY DISCHARGE OF ROANOKE RIVER AT NEAL, N. C. [Drainage area, 8,717 square miles]

	1				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1896					
August	4,105	2,750	3,154	0.36	0.41
September	6,510	2,400	3,217	0.37	0.41
October	39,720	2,890	9,117	1.05	1.21
November	23,220	2,890	5,896	0.68	0.75
December	21,820	3,415	7,423	0.85	0.98
1897					
January	12,010	2,790	4,501	0.52	0.60
February	64,300	2,915	28,178	3.23	3.36
March	37,700	7,320	22,824	2.62	3.02
April	22,270 21,160	4,525	8,440	0.97 1.00	1.08 1.15
May	9,040	4,410	8,707 4,252	0.49	0.55
July	7,410	3,005 2,790	3,956	0.49	0.53
August	3,650	2,790	2,673	0.31	0.36
September.	3,150	2,000	2,217	0.25	0.28
October	4,465	2,010	2,561	0.29	0.33
November	8,710	2,340	3,095	0.36	0.40
December	10,190	3,250	5,520	0.63	0.72
The year	64,300	2,000	8,077	0.93	12.37
1898 January	11,300	2 200	4,597	0.53	0.61
February	5,910	3,200 2,935	3,544	0.33	0.43
March.	6,900	2,935	3,736	0.43	0.49
April	14,120	3,568	6,903	0.79	0.88
May	29,859	3,200	13,100	1.50	1.73
June	14,755	2,445	5,399	0.62	0.69
July	5,910	2,347	3,766	0.43	0.49
August	14,595	2,895	4,815	0.55	0.63
September	34,274	2,060	7,980	0.92	1.02
October	28,762	2,855	8,582	0.98	1.13
November	17,204	3,810	6,437	0.74	0.82
December	24,735	3,910	8,958	1.03	1.19
The year	34,274	2,060	6,485	0.74	10.11
1899 January	62,750	6,880	18,585	2.13	2.46
February	58,300	8,440	29,967	3.44	3.58
March	83,000	18,030	37,777	4.33	4.99
April	31,500	8,440	15,863	1.82	2.03
May	12,340	5,490	8,106	0.93	1.07
June	27,640	4,580	10,759	1.23	1.37
July	11,240	3,740	6,095	0.70	0.81
August	13,110	2,690	5,626	0.65	0.75
September	13,440	2,970	5,564	0.63	0.70 0.60
October November	9,240	3,180	4,563	0.52 0.70	0.60
December	13,620 10,840	3,915 3,740	6,132 5,566	0.63	0.72
The year	83,000	2,690	12,884	1.48	19.86
	30,000				

MONTHLY DISCHARGE OF ROANOKE RIVER AT NEAL, N. C .- Continued

The second secon	. 1				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inche
1900			4. 4.0		
nuary	31,750	2,580	11,940	1.37	1.
ebruary	33,5,50	4,190	16,449	1.89	- 1.
arch	37,747	11,645	17,575	2.02	2
pril	49,140	6,150	16,222	1.86	2
ay	14,643	4,470	7,166	0.82	0
ine	17,930	3,980	7,561	0.87	0
uly	13,370	2,180	5,124	0.59	0
ugust	6,610	1,560	2,311	0.27	0
eptember	11,990	1,380	2,766	0.32	0
ctober	15,480	2,050	3,693	0.42	0
Tovember	11,070	2,720	4,362	0.50	0
December	23,500	3,770	7,119	0.82	0
The year	49,140	1,380	8,468	0.971	13
	33,850	4,190	10,053	1.15	1
anuary	7,700	3,630	5,186	0.59	0
ebruary			9,370	1.07	1
Iarch	41,550	3,420 11,070	24,914	2.86	
pril	55, 260	4,980	20,817	2.39	$\frac{3}{2}$
Iay	84,400			1.28	100
une	27,640	5,240	11,138		1
uly	51,055	5,205	15,898	1.82	2
ugust	57,300	4,190	30,897	3.54	4
eptember	30,550	5,130	10,919	1.25	1
October	13,380	4,190	6,563	0.75	0
Vovember December	8,305 52,535	3,980 4,400	4,637 14,865	0.53 1.70	0
The year	84,400	3,420	13,763	1.58	21
1902					
anuary	80,800	6,705	21,294	2.44	2
ebruary	50,202	7,800	20,529	2.36	2
faich	67,250	9,390	26,139	3.00	3
pril	25,910	6,705	13,258	1.52	1
Iay	11,300	5,130	7,965	0.91	1
une	28,650	3,420	7,493	0.86	0
uly	6,515	2,375	3,916	0.45	0
ugust					
eptember	5,910	2,720	3,703	0.42	0
October	39,075	3,910	11,793	1.35	1
Vovember	15,430	4,050	6,795	0.78	0
December	37,975	8,050			
anuary	56,277	8,412	20,798	2.39	2
ebruary	76,400	11,650	33,081	3.79	3
farch	84,800	12,730	32,985	3.78	4
pril	48,493	21,575	33,880	3.89	4
	10, 100	21,010	00,000	0.00	1

DAN RIVER NEAR PINNACLES, VA.

LOCATION. In the middle of Pinnacles Gorge, 3 miles southeast of Pinnacles, Patrick County, 3 miles north of Kibler, Va., 4 miles south of Meadows of Dan, and 7 miles upstream from North Carolina state line.

Drainage Area. 35 square miles, determined by a compass and transit survey around basin by private engineers.

Records Avanable October 20, 1020 to Navarches 24, 1021

RECORDS AVAILABLE. October 29, 1920 to November 24, 1921, when the station was discontinued.

GAGE. A vertical staff on right bank at end of measuring weir; read by C. M. Gentry. The location is very inaccessible so that only one daily reading could be obtained.

DISCHARGE MEASUREMENTS. A rectangular, sharp-edged timber weir attached to heavy timber, bolted to bedrock. The joint between rock and weir was not tight so some water escaped under weir. The weir discharge table was checked by one current meter discharge measurement made by wading. A standard weir formula was used to compute weir rating table.

CHANNEL AND CONTROL. Channel approaches weir on a fairly straight line, the weir forming a pool 3 or 4 feet deep at low stages. Control formed by weir. Extremes of Discharge. Maximum stage recorded, 2.9 feet morning of De-

cember 14 (discharge, 686 second-feet); minimum stage recorded, 0.22 foot from October 20 to 24, 1921 (discharge, 17 second-feet).

Ice. None reported.

REGULATION. Low stages considerably affected by operation of several mill dams upstream.

4 110 30 31 5 131 32 32 7 187 34 33 8 127 35 38 9 96 36 38 1 131 37 38 3 106 39 38 3 107 40 40 4 107 40 41 5 81 41 42 7 92 43 8 102 44 61 9 93 45 57 9 93 45 57 9 93 45 57 9 48 100 1 75 47 83 2 61 48 182 3 58 49 128 4 47 50 220 5 45 51 130		Yea	ar		Year		
22 147 28 33 170 29 44 110 30 55 131 31 66 238 32 7 187 33 8 185 34 9 127 35 90 96 36 11 131 37 22 93 38 33 106 39 44 107 40 45 107 40 44 107 40 45 100 44 46 100 44 47 92 43 48 100 44 49 93 45 57 76 46 100 100 11 75 47 83 22 61 48 182 33 58 49 128 44 50 220 220 55 45 51 130	Week	1920	1921	Week	1920	1921	
22 147 28 33 170 29 44 110 30 55 131 31 66 238 32 7 187 33 3 185 34 9 127 35 90 96 36 1 131 37 2 93 38 3 106 39 4 107 40 4 107 40 5 81 41 6 184 42 9 93 45 57 7 92 43 8 102 44 61 9 93 45 57 7 46 100 1 75 47 83 2 61 48 182 33 58 49 128 44 47 50 220 5 45 51 130			81	27		4	
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66 238 32 7 187 33 8 185 34 90 127 35 90 36 96 11 131 37 2 93 38 3 106 39 4 107 40 5 81 41 6 184 42 7 92 43 9 93 45 57 9 93 45 57 9 76 46 100 1 75 47 83 2 61 48 182 3 58 49 128 4 47 50 220 5 45 51 130			110	30		5	
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MONTHLY DISCHARGE OF DAN RIVER NEAR PINNACLES, VA. [Drainage area, 35 square miles]

]				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1920					
November	310	53	93.7	2.68	2.99
December	686	82	154	4.40	5.07
1921					
January	540	72	131	3.74	4.31
February	500	87	183	5.23	5.45
March		87	104	2.97	3.42
April	310	72	118	3.37	3.76
May	212	57	83.8	2.39	2.76
June	72	45	53.8	1.54	1.72
July	310	31	63.8	1.82	2.10
August	45	20	27.3	.780	.90
September	60	17	27.8	.794	.89
October	190	17	33.8	.966	1.11

DAN RIVER AT MADISON, N. C.

- LOCATION. At Southern Railway bridge about one-fourth mile from Madison, Rockingham County, and half a mile above the mouth of Mayo River.

 Drainage Area. 605 square miles.
- Records Available. May 7, 1903 to December 31, 1908, when station was discontinued.
- Gage. Chain gage attached to bridge; read by J. W. Ore. Datum unchanged. DISCHARGE MEASUREMENTS. Made from bridge to which gage is attached.
- CHANNEL AND CONTROL. Bed of sand and gravel and changes frequently with swift current; one channel at all stages. Control not known. Channel straight for about 600 feet above the station; 300 feet below there is an abrupt turn. Both banks low and subject to overflow.
- Extremes of Discharge. Maximum stage recorded, 20.3 feet August 26, 1908 (discharge not determined); minimum stage recorded, 0.2 foot October 9 to 19, 1904 (discharge, 180 second-feet).
- ICE. Stage-discharge relation not affected by ice.
- REGULATION. Not known
- Accuracy. Stage-discharge relation fairly permanent. Low-water rating curve fairly well defined; no high-water curve has been developed. Gage read once daily to half-tenths. Daily discharge ascertained by applying daily gage height to rating table. 1903 records poor; the rest of the record fairly good for low water.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF DAN RIVER AT MADISON, N. C.

Week	Year									
	1903	1904	1905	1906	1907	1908				
1		334	862							
2		385	1,017		709					
3		332	479	845	916	91				
4		464	436	010	519	68				
5		343	502		563	61				
6		692	405	675	578	0.				
7		419	1,019	587	517					
8		1,107	2,511	701	498					
9		545	1,019	701	130	1.024				
10		798	773	732	768	1,02				
11		505	781	600	852	864				
12		1,302	522	000	602	80.				
13		757	547	779	579	908				
14					919	906				
15		504 473	1,036	748	770	683				
16			931	755	752					
		389	759	715	586	856				
17		471	651	552	700	636				
		387	1,067	578	763					
19		509	1,531	. 554	682					
20	699	994	2,953	422	559	625				
21	644	417	798	429	489	734				
22	1,196	549	1,375	455		529				
23		472	475		731					
24	933	781	414	983		921				
25	949	669	515	924		776				
26	1,288	612	444		676	531				
27	799	355	1,019	536	699	908				
28	1,052	361	1,433			543				
29	569	349	756		685	564				
30	555	663	946		453	605				
31	1,187	905	872		472	427				
32	650	1,323	1,312		439	607				
33	1,505	626	1,147		599	388				
34	548	1,018	1,460		412					
5	479	435	678		306					
86	602	414	737	831	391					
37	395	359	451		539	473				
88	812	318	425	824		392				
39	378	231	358	744		444				
10	350	206	356		427	347				
1	482	182	527		376					
2	442	185	391		333	485				
3	346	204	384		315	692				
4	344	206	376	748	446					
5	487	252	352	660	390	565				
6	448	252	326	658	400	300				
7	410	242	319	718	400	597				
8	346	238	315	658	732	522				
9	349					322				
0		494	486	594	469					
	371	272	981	635						
2	434	282	2,469			0.40				
4	410	518	1,272	675		846				

MONTHLY DISCHARGE OF DAN RIVER AT MADISON, N. C. [Drainage area 605 square miles]

	1	Discha	rges ir	Second-feet		
Month	Maximum	Mini	mum	Mean	Per Square Mile	Run-off in Inches
1903					,	
May 8-31	2,465		574	992	1.64	1.46
June	3,300	-	710	1,199	1.98	2.21
July	2,735	-	416	742	1.23	1.42
August	4,250		401	910	1.50	1.73
September	2,495		358	541	.894	1.00
October	813		330	398	.658	.76
November	1,020		317	418	.691	.77
December	795		265	388	.641	.74
1904						
January	727		216	376	0.621	0.72
February	2,375	1	265	659	1.09	1.18
March	5,255		416	808	1.34	1.54
April	710		330	463	.765	.85
May	3,455		330	550	.909	1.05
June	1,575	1	278	653	1.08	1.20
July	1,335		228	480	.793	.91
August	2,615		330	865	1.43	1.65
September	659		228	349	.577	.64
October	216		180	195	.322	.37
November	330		204	242	.400	.45
December	953		240	386	.638	.74
The year	5,255		180	502	.830	11.30
1905 January	3,880		278	686	1.13	1.30
February	4,460		304	1,195	1.98	2.06
March	1,525	-	476	684	1.13	1.30
April	3,170		416	822	1.36	1.52
May	4,020		401	1,306	2.16	2.49
June	885		372	496	.820	.91
July	3,660	1	386	1,019	1.68	1.94
August	2,615		461	1,134	1.87	2.16
September	1,155		330	495	.818	.91
October	1,290	-	317	412	.681	.79
November	372	1	304	334	.552	.62
December	11,000	1	304	1,237	2.04	2.35
The year	11,000	1	278	818	1.35	18.35

DAN RIVER AT SOUTH BOSTON, VA.

LOCATION. At Norfolk and Western Railway bridge at South Boston, Halifax County. Banister River enters from the north about 7 miles below station.

Drainage Area. 2,750 square miles.

RECORDS AVAILABLE. August 27, 1900 to May 5, 1907.

Gage. Chain installed May 18, 1903, to replace wire gage previously used; read twice daily.

DISCHARGE MEASUREMENTS. Made from bridge.

Channel and Control. Left bank high; is not overflowed. At high stages right bank is subject to overflow for several hundred feet under a curved trestle approach to bridge. Bed of stream, sand and mud. Control section shifts during floods.

Extremes of Discharge. Maximum stage recorded, 25.2 feet at 4 p.m. December 31, 1901 (discharge, 52,600 second-feet); minimum stage recorded, 0.10 foot at 10 a.m. October 11, 1904 (discharge, 350 second-feet).

ICE. Discharge relation not seriously affected by ice.

ACCURACY. Rating curves fairly well defined from 850 to 50,000 second-feet. Records fairly good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF DAN RIVER AT SOUTH BOSTON, VA.

W 1	Year								
Week	1900	1901	1902	1903	1904	1905	1906	1907	
1		2,354	8,454	11,285	1,476	3,523	13,482	5,834	
2		6,117	3,323	4,570	1,838	5,658	3,995	2,194	
3		3,479	2,996	3,886	1,480	2,354	3,904	2,084	
4		2,054	4,550	3,807	2,126	1,309	7,256	2,416	
5		2,396	7,937	3,642	1,358	1,140	4,288	2,257	
6		2,482	4, 193	9,348	3,239	1,417	3,332	3,011	
7		1,862	3,040	15,205	1,899	4,429	2,702	2,720	
8		1,711	5,493	9,280	5,619	9,041	2,389	1,969	
9		1,702	18,137	5,239	2,428	4,667	3,399	3,660	
10		1,826	6,057	4,537	3,152	3,035	3,384	4,456	
11		1,722	5,043	5,909	2,203	3,461	3,115	5,753	
12		1,711	5,021	20,587	3,307	2,049	3,932	2,419	
13		9,779	8,316	9,383	3,053	2,128	6,074	2,104	
14		14,887	5,036	7,525	1,803	3,825	3,475	4,317	
15		2,613	5,563	9,917	1,596	5,738	3,769	3,406	
16		5,237	4,551	5,812	1,373	4,465	3,164	2,411	
17		3,768	4,004	6,580	1,700	2,539	2,319	3,646	
18		2,493	3,918	4,238	1,743	2,516	2,229		
19		2,375	3,901	3,627	1,674	4,396	2,526		
20		2,354	4,018	3,162	3,387	6,319	1,816		
21		22,763	3,998	2,637	1,721	4,395	1,900		
22		3,927	3,194	6,409	2,376	5,938	1,957		
23		2,519	2,446	6,636	2,336	1,766	1,783		
24		2,107	3,083	6,029	2,270	1,435	2,553		
25		2,182	6,163	5,301	1,610	1,535	3,616		
26		2,064 2,214	2,882 2,577	3,999 7,741	1,684	1,532	3,101		
27		11,507	1,836	5,271	1,652	4,265	2,576		
28		10,030	1,229	2,579	1,322	5,743	2,574		
30		2,332	1,132	1,652	958 2,909	2,595 3,179	4,611 7,850		
31		2,334	1,132	2,298	3,589	2,839	3,124		
32		14,034	1,136	2,622	5,687	4,863			
33		15,834	1,280	3,280	1,852	4,341	3,149 3,086		
34		5,463	1,237	1,729	2,010	2,834	9,277		
35		7,972	1,079	4,010	1,260	2,111	3,780		
36	939	2,787	1,261	1,600	2,300	3,019	3,417		
37	1,205	2,300	1,218	2,054	3,948	1,323	1,893		
38	2,437	3,517	1,034	3,339	1,610	1,157	2,723		
39	1,307	2,664	2,651	1,377	1,285	1,216	2,351		
40	1,313	3,308	3,707	1,263	896	1,277	4,779		
41	1,768	2,279	6,109	1,959	617	1,896	1,700		
42	1,666	2,118	2,225	1,645	678	1,398	4,639		
43	2,681	1,919	1,150	1,410	834	1,326	4,593		
44	1,702	1,897	1,423	1,420	817	1,369	2,901		
45	1,854	1,925	1,721	2,102	1,020	1,201	2,026		
46	1,514	1,860	1,815	1,720	1,738	1,279	2,284		
47	1,394	1,983	2,064	2,000	1,195	1,387	2,514		
48	2,659	2,154	2,856	1,570	1,211	1,492	1,926		
49	5,276	2,863	8,921	1,539	3,121	2,829	2,037		
50	2,375	6,894	3,139	1,570	1,574	3,235	2,329		
51	2,300	3,371	2,569	1,585	1,506	6,926	2,284		
52	2,281	14,666	2,188	2,477	1,787	7,719	3,331		

Monthly Discharge of Dan River at South Boston, Va. [Drainage area, 2,750 square miles]

		Discharges in Second-feet				
Month	Maximum	Minimum	. Mean	Per Square Mile	Run-off in Inches	
1900						
September	7,605	700	1,430	0.52	0.5	
October	6,500	1,200	1,842	0.67	0.7	
November	4,600	1,360	1,804	0.66	0.7	
December	15,100	2,075	2,785	1.01	1.10	
1901						
January	21,965	1,860	3,387	1.23	1.45	
February	2,675	1,600	2,042	0.74	0.7	
March	25,000	1,600	3.504	1.27	1.46	
April	38,800	2,375	6,382	2.32	2.59	
May	46,600	2,300	7,297	2.65	3.06	
June	3,100	1,925	2,292	0.83	0.98	
July	44,200	2,150	6,132	2.23	2.58	
August	36,600	1,860	9,866	3.59	4.14	
September	5,100	2,150	2,902	1.06	1.18	
October	4,100	1,860	2,353	0.86	0.99	
Novembe.	3,730	1,730	2,032	0.74	0.8	
December	51,200	2,000	6,875	2.50	2.89	
The year	51,200	1,600	4,589	1.67	22,84	
1902 January	30,000	2,675	4,738	1.72	1.98	
February	26,760	2,930	7,105	2.58	2.69	
March	26,120	3,730	7,269	2.64	3.04	
April	8,640	3,730	4,834	1.76	1.96	
May	4,450	3,100	3,876	1.41	1.68	
June	20,615	2,150	3,535	1.29	1 4	
July	3,775	1,075	1,713	0.62	0.7	
August	1,480	1,050	1,197	0.44	0.5	
September	3,415	900	1,545	0.56	0.65	
October	7,550	1,250	3,158	1.15	1.3	
November	2,525	1,420	1,842	0.67	0.75	
December	13,460	2,150	4,186	1.52	1.7	
The year	30,000	900	3,750	1.36	18.4	
anuary	28,240	2,700	5,934	2.16	2.49	
February	39,800	3,510	9,953	3.62	3.78	
March	39,800 44,400	3,800	10,084	3.62	4.25	
April		5,050			3.27	
May	22,670 9,520		8,065	2.93		
fune		2,475	4,050	1.47	1.69	
uly	17,750	2,350	5,785	2.10	2.34	
	16,700	1,465	4,389	1.60	1.84	
lantember						
September	0.40*					
October	3,465	1,185	1,551	0.56	0.65	
Vovember December	4,070	1,355	1,811	0.66	0.74	
>cccmper	6,635	1,376	1,811	0.66	0.76	

MONTHLY DISCHARGE OF DAN RIVER AT SOUTH BOSTON, VA.—Continued

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1904					
January	2,665	750	1,663	0.605	0.697
February	11,270	1,518	3,229	1.18	1.27
March	9,290	1,596	2,847	1.04	1.20
April	2,868	1,323	1,663	0.605	0.675
May	7,275	1,091	1,999	0.727	0 838
June	4,755	976	2,147	0.781	0.871
July	5,548	824	1,877	0.683	0.788
August	11,430	876	2,901	1.05	1.21
September	10,795	1,029	2,250	0.818	0.913
October	1,417	375	772	0.281	0.324
November	2,569	608	1,233	0.448	0.500
December	4,510	1,245	1,953	0.710	0.819
The year	11,430	375	2,045	0.744	10.11
1905					
January	13,370	1,006	3,004	1.09	1.26
February	18,270	1,052	4,563	1.66	1.73
March	5,730	1,713	2,635	0.958	1.10
April	11,900	1,541	3,992	1.45	1.62
May	17,160	1,729	4,845	1.76	2.03
June	6,720	1,230	1,867	0.679	0.758
July	10,400	1,440	3,927	1 43	1.65
August	10,820	1,385	3,382	1.23	1.42
September	6,214	1,076	1,709	0.621	0.693
October	3,568	937 976	1,463	0.532	0.613
November	1,635 17,720	1,401	1,337 5,020	0.486 1.83	0.542 2.11.
The year	18,270	937	3,145	1.14	15.53
1906		2.700	7 100		2.00
January	30,200	2,700	7,160	2.60	3.00
February	4,040 11,500	1,910 2,110	2,750 3,960	1.00	1.04 1.66
April		2,110	3,320	1.44	1.00
May	3,440	1,420	2,130	0.774	0.89
June	5,840	1,380	2,650	0.963	1.07
July	13,300	1,870	4,250	1.55	1.79
August	26,200	2,730	6,410	2.33	2.69
September.	5,220	1,730	2,670	0.971	1.08
October	13,600	1,050	3,870	1.41	1.63
November	2,830	1,810	2,270	0.825	0.92
December	10,700	1,850	2,480	0.902	1.04
The year	30,200	1,050	3,660	1.33	18.16
January	11,400	1,930	3,040	1.11	1.28
February	3,700	1,750	2,530	0.920	0.96
March	9,700	1,930	3,830	1.39	1.60
April	6,180	2,010	3,430	1.25	1.40
	1				

TAR RIVER BASIN

TAR RIVER AT TARBORO, N. C.

LOCATION. On Atlantic Coast Line Railroad bridge at Tarboro, Edgecombe County.
DRAINAGE AREA. 2,290 square miles.*

RECORDS AVAILABLE. July 26, 1896 to December 31, 1900, when station was

discontinued.

Gage. Wire gage fastened to bridge; read by R. H. Williams. DISCHARGE MEASUREMENTS. Made from railroad bridge. When this section is obstructed occasionally by rafts of logs measurements are made from highway bridge about 200 yards above.

Channel and Control. Bed is sandy; fairly permanent. Current moderately swift and channel straight. Sand bars in channel affect stage-discharge relation at low stages. Both banks low and flooded during high water.

Extremes of Discharge. Maximum stage recorded, 25.0 feet February 11, 1899 (discharge, approximately 19,850 second-feet); minimum discharge recorded, 87 second-feet November 2, 1900.

ICE. Stage-discharge relation not affected by ice.

REGULATION. Diurnal regulation during low water due to operation of mills above. Accuracy. Stage-discharge relation shifting. Rating curves poorly defined up to 14,000 second-feet. Gage read to tenths, for a while to hundredths, once a day. Daily discharge ascertained by applying daily gage height to rating table. Records poor.

^{*}Drainage area furnished by U. S. G. S, but later checked and found to be 2100 square miles. The monthly tables had however, been completed using the original drainage area.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF TAR RIVER AT TARBORO, N. C.

	Year							
Week	1896	1897	1898	1899	1900			
1		1,608	1,278	1,386	1,304			
2		1,259	1,024	1,593	2,131			
3		1,605	1,282	4,856	4,287			
4		2,795	1,613	2,197	4,105			
5		2,605	1,764	3,050	1,794			
6		6,182	1,101	13,284	2,434			
7		3,592	873		9,263			
8		4,493	973	16,241	7,626			
9		6,519	864	11,819	7,721			
10		4,816	2,500	12,173	6,491			
11		11,002	1,998	8,139	5,536			
12		8,894	1,598	12,161	3,825 4,779			
13		2,633 2,877	1,499 4,202	4,329 4,439	4,179			
14		7,221	2,805	10,824	3,166			
16		3,447	1,465	3,005	5,342			
17		1,552	1,432	2,309	7,522			
18		2,048	1,685	1,911	2,009			
19		1,259	2,735	1,507	1,473			
20		2,483	3,317	1,481	1,339			
21		914	4,351	1,065	2,032			
22		859	4,700	975	1,309			
23		847	1,100	858	729			
24		584	763	3,689	781			
25		703	2,775	2,515	2,241			
26		495	1,145	574	1,846			
27		377	1,753	671	590			
28		1,446	5,507	704	355			
29		1,182	2,173	847	428 605			
30	220	1,906	968 1,074	1,791 4,952	837			
32	633 811	749 453	735	1,749	290			
33	682	343	1,409	1,812	375			
34	441	318	2,533	1,497	321			
35	578	513	3,199	535	334			
36	386	1,076	1,397	387	237			
37	485	282	852	1,212	146			
38	2,003	230	396	479	309			
39	2,095	209	2,074	852	188			
40	1,226	202	636	618	141			
41	519	205	696	3,238	349			
42	668	188	701	971	227			
43	510	404	1,116	628	168			
44	483	930	1,009	2,706	202			
45	1,112	1,025	1,192	2,140	1,516 488			
46	1,178 646	418 379	916 1,988	777	329			
48	936	805	1,797	1,018	464			
49	2,591	1,288	5,561	1,088	905			
50	3,007	862	2,864	1,106	621			
51	7,534	1,173	1,901	981	720			
52	2,136	2,281	2,400	2,795	1,329			
	_,,,,,	-,						

Monthly Discharge of Tar River at Tarboro. N. C. [Drainage area, 2,290 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1896					
July 26-31	1,618	774	1,268	0.55	0.13
August		390	628	0.27	0.31
September	3,910	250	1,190	0.52	0.58
October	2,000	408	703	0.30	0.35
Novembr	1,910	476	842	0.37	0.41
December	9,460	1,420	3,739	1.63	1.88
1897					
January	4,460	1,155	1,814	0.79	0.91
February	8,725	1,480	4,888	2.13	2.22
March	14,600	2,197	6,789	2.96	3.41
April	9,800	1,280	3,636	1.59	1.77
May	3,915	690	1,580	0.69	0.79
June	1,280	360	689	0.30	0.33
July	3,725	310	1,198	0.52	0.60
August	860	247	399	0.17	0.20
September	2,460	196	490	0.21	0.23
October	770	170	295	0.13	0.15
November	2,250	347	674	0.29	0.32
December	3,072	770	1,430	0.62	0.71
The year	14,600	170	1,990	0.87	11.64
1898					
January	2,957	905	1,380	0.60	0.69
February	1,580	730	1,051	0.46	0.48
March	3,787	750	1,697	0.74	0.85
April	5,510	905	2,523	1.10	1.23
May	8,680	1,085	3,438	1.50	1.73
June	3,420	470	1,600	0.70	0.78
July	6,925	385	2,419	1.06	1.22
August	4,880	505	1,733	0.76	0.87
September	4,460	360	1,356	0.59	0.65
October	1,430	385	816	0.36	0.41
November	2,735	690	1,338	0.58	0.64
December	8,050	1,480	3,110	1.36	1.57
The year	8,650	360	1,855	.82	11.12
January	6,247	1,250	2,440	1.07	1.23
February	19,850	3,060	11,874	5.19	5.40
March	15,850	3,835	9,537	4.16	4.80
April	13,240	1,755	5,060	2.21	2.47
May	2,030	705	1,354	0.59	0.68
June	6,413	500	1,907	0.83	0.92
July	5,459	430	1,250	0.55	0.63
August	6,413	453	2,028	0.89	1.02
September	2,250	350	711	0.31	0.35
October	4,845	453	1,325	0.58	0.67
November	5,666	735	1,598	0.70	0.78
December	4,685	800	1,524	0.66	0.76
The year	19,850	350	3,334		

MONTHLY DISCHARGE OF TAR RIVER AT TARBORO, N. C .- Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in inches
1900					
January	6,405	1,120	2,864	1.25	1.44
February	12,970	1,520	5,952	2.60	2.70
March	9,640	2,865	5,445	2.38	2.75
April	10,540	1,995	4,802	2.10	2.34
May	2,805	920	1,664	0.73	0.84
June	3,805	550	1,376	0.60	0.67
July	1,995	230	552	0.24	0.28
August	840	230	· 384	0.17	0.20
September	550	134	233	0.10	0.11
October	620	87	210	0.09	0.10
November	2,325	87	659	0.29	0.32
December	2,045	410	880	0.38	0.48
The year	12,970	87	2,085	0.91	12.19

NEUSE RIVER BASIN

NEUSE RIVER AT SELMA, N. C.

LOCATION. At Southern Railway bridge about 3 miles from Selma, Johnston County Drainage Area. 1,240 square miles.

RECORDS AVAILABLE. July 29, 1896 to December 31, 1900, when station was discontinued.

Gage. Wire gage on railway bridge; moved February 6, 1899 to highway bridge about 600 feet below; read by C. Richardson.

DISCHARGE MEASUREMENTS. Made from bridge.

Channel and Control. Bed of river sandy and muddy; subject to shifts during high water. Flow obstructed by one pier of bridge. Channel straight; current moderately swift and confined to one channel.

Extremes of Discharge. Maximum stage recorded, 20.98 feet February 9, 1899 (discharge, 12,000 second-feet); minimum stage recorded, —0.4 foot October 17 and 18, 1897 (discharge, 73 second-feet).

ICE. Stage-discharge relation not affected by ice.

REGULATION. Slight if any.

Accuracy. Stage-discharge relation fairly permanent but affected by variation in slope with rate of change in stage. Rating curve poorly defined throughout. Gage read to tenths twice daily. Daily discharge ascertained by applying daily gage height to rating table. Records poor.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF NEUSE RIVER AT SELMA, N. C.

	Year								
Week	1896	1897	1898	1899	1900				
1		354	375	482	40				
2		327	331	1,508	2,37				
3		548	370	2,249	1,79				
4		1,999	969	727	1,02				
5		1,151	498	1,378	49				
6		3,844	324	9,953	1,09				
7		1,324	298	4,857	7,48				
8		2,707	408	8,907	2,95				
9		1,507	325	6,969	3,97				
0		2,609	1,006	7,440	2,93				
		7,540	1,018	6,124	2,65				
2		2,399	640		1,35				
3		768	1,891	5,143	1,33				
4				1,940	1,29				
		1,839	2,951	2,963					
		3,487	817	3,987	2,16				
6		785	391	1,133	5,06				
7		513	663	1,126	4,58				
8		946	427	633	1,28				
9		396	1,273	1,058	77				
0		1,679	1,804	1,342	1,16				
1		497	2,491	1,110	88				
2		819	896	926	46				
3		576	243	793	38				
24		332	788	1,908	41				
5		329	470	469	79				
6		318	211	354	1,29				
7		238	793	388	48				
8		900	1,034	509	31				
9		689	1,027	943	26				
0		685	300	1,821	2,21				
1	431	225	259	2,721	51				
2	876	151	245	843	25				
3	351	142	769	636	33				
4	324	293	1,819	295	23				
55	232	152	2,334	289	48				
6	185	142	805	234	23				
7	138	138	633	254	43				
88	351	117	436	234	41				
9	211	91	2,536	430	23				
00	783	84	189	399	21				
1	213	84	351	1,448	20				
2	207	89	329	325	22				
3	209	165	455	296	17				
4	199	144	591	3,402	24				
5	668	262	364	725	83				
6	282	194	563	450	33				
7	211	162							
8	437	357	1,217 596	358	26 61				
9	848			291					
50		477	2,869	358	1,07				
51	943	383	701	591	45				
	1,756	800	500	430	648				
2	425	1,199	513	456	66				

Monthly Discharge of Neuse River Near Selma, N. C. [Drainage area, 1,240 square miles]

${f Month}$	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1896					
August	1,720	169	470	0.379	0.44
September	1,520	123	218	.176	.20
October	2,500	138	336	.271	.31
November.	1,440	186	334	.269	.30
December	3,460	339	975	.786	.91
1897					
January.	3,640	318	793	.640	.74
February	6,090	453	2,420	1.95	2.03
March	8,840	691	3,110	2.51	2.89
April	7,000	477	1,590	1.28	1.43
May	3,820	382	856	.690	.80
June	1,940	203	489	.394	.44
July	1,760	186	594	.479	.55
August	477	138	190	.153	.18
September	153	84	123	.099	.10
October	186	73	110	.089	.10
November	607	123	215	.173	.10
December	1,940	298	714	.576	.66
December	1,510		111	.010	.00
The year	8,840	73	934	.75	10.12
1898					
January	2,400	278	528	.426	.49
February	663	258	344	.277	.29
March	3,460	298	• 912	.735	.89
April	4,900	318	1,330	1.07	1.15
May	4,660	221	1,460	1.18	1.36
June	1,520	186	447	.360	.40
July	2,400	203	734	.592	.68
August	4,300	203	1,090	.879	1.01
September	5,950	258	1,160	.935	1.04
October	691	153	343	.277	.32
November	1,860	339	682	.550	.61
December	4,900	382	1,100	.887	1.02
The year	5,950	153	844	.68	9.26
January	3,400	360	1,180	.952	1.10
February	12,600	1,760	6,990	5.64	5.87
March.	10,100	1,760	5,480	4.42	5.10
April	8,760	527	2,210	1.78	1.99
May	1,900	453	1,030	.831	.96
June		339	918	.740	.83
	3,880	298	1,010	.815	.94
JulyAugust	4,180	298	892	.719	.83
	4,480	194	287	.231	.26
September	780				.26
October	4,480	203	718	.579	
November	4,900	239	1,030	.831	.93
December	1,070	298	453	.365	.42
The year	12,600	194	1,850	1.49	19.90

MONTHLY DISCHARGE OF NEUSE RIVER NEAR SELMA, N. C .- Continued

		Discharges	in Second-fe	et	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1000					
1900	4 700	900	1 910	1.00	1 00
January	4,780	298	1,310	1.06	1.22
February	9,670	405	3,200	2.58	2.69
March	6,020	810	2,490	2.01	2.32
April	10,000	810	3,040	2.45	2.73
May	2,900	453	965	.778	.90
June	1,990	339	665	.536	.60
July	5,260	221	834	.673	.78
August	1,140	186	335	.270	.31
September	1,720	186	340	.274	.31
October	258	138	199	160	.18
		138	502	.405	
November	1,940	,			.45
December	2,450	278	682	.550	.63
The year	10,000	138	1,213	.98	13.12

CAPE FEAR RIVER BASIN

HAW RIVER AT MONCURE, N. C.

- LOCATION. At the bridge of the Seaboard Air Line Railroad, 134 miles north of Moncure, Chatham County, and about 2 miles from the junction of Haw and Deep rivers forming the Cape Fear.

 Drainage Area. 1,800 square miles.

 Records Available. May 6, 1898 to December 31, 1899, when station was dis-
- continued.

- Gage. Wire gage attached to railroad bridge; read by M. A. Moore.

 DISCHARGE MEASUREMENTS. Made from bridge to which gage is attached.

 CHANNEL AND CONTROL. Bed of stream, coarse sand and gravel; fairly permanent.

 Channel straight for some distance above and below station. Control not known. Both banks low and subject to overflow at extreme stages.
- Extremes of Discharge. Maximum stage recorded, 26.62 feet February 9, 1899 (discharge, 24,200 second-feet); minimum stage recorded, 0.82 foot October 3 and 4, 1899 (discharge not determined).
- ICE. Stage-discharge relation not affected by ice.
- REGULATION. There are four hydro-electric plants above the station causing diurnal fluctuations.
- ACCURACY. Stage-discharge relation shifting. Rating curve poorly defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records poor.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF HAW RIVER AT MONCURE, N. C.

	Yea	r		Year		
Week	1000	1000	Week	1000	4000	
	1898	1899		1898	1899	
1		2,503	27	1,222	1,29	
		3,757	28	529	399	
		4,189	29	1,221	37	
4		1,440	30	1,061	1,76	
5		2,734	31	552	1,53	
6		18,479	32	428	1,84	
		7,705	33	2,823	42	
8		8,368	34	6,278	310	
		8,666	35	1,867	37	
9			36			
0		8,119		4,106	29	
1		10,079	37	719	83	
		6,786	38	1,578	39	
3		4,385	39	2,012	38	
4		3,929	40	615	1,48	
5		4,045	41	477	2,01	
6		1,340	42	501	36	
7		1,958	43	1,471	31	
8		1,120	44	3,122	2,89	
9	1,632	3,443	454	812	81	
0	896	2,490	46	1,744	38	
1	2,284	960	47	1,880	40	
2	828	1,128	48	993	77	
3	457	8 56	49	2,445	39	
4	582	1,760	50	865	6.1	
5	885	482	51	839	39	
6	485	396	52	930	47	

MONTHLY DISCHARGE OF HAW RIVER AT MONCURE, N. C. [Drainage area, 1,800 square miles]

		t			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1898					
May 5-31	5,795	380	1,453	0.81	0.93
June	1,570	320	613	0.34	0.38
July	4,585	320	955	0.53	0.61
August	13,250	290	2,545	1.41	1.63
September	9,250	345	2,077	1.15	1.28
October	7,300	290	1,097	0.61	0.70
November	3,998	575	1,496	0.83	0.92
December	4,895	600	1,255	0.70	0.81

MONTHLY DISCHARGE OF HAW RIVER AT MONCURE, N. C .- Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1899					
January	9,700	730	2,840	1.58	1.82
February	24,200	2,425	9,860	5.48	5.71
March	21,000	2,213	7,816	4.34	5.00
April	11,000	950	2,790	1.55	1.73
May	6,200	625	1,881	1.05	1.21
June	3,190	320	944	0.52	0.58
July	5,570	305	1,019	0.57	0.66
August	2,935	270	856	0.48	0.55
September	1,690	270	465	0.26	0.29
October	5,390	280	1,028	0.57	0.66
November	8,100	320	1,116	0.62	0.69
December	1,450	305	464	0.26	0.30
The year	24,200	270	2,590	1.44	19.20

MORGAN CREEK NEAR CHAPEL HILL, N. C.

Location. About 3 miles northwest of Carrboro, about 5 miles northwest of Chapel Hill, Orange County, and about 7 miles above mouth of creek.

Drainage Area. 29 square miles. Records Available. January 20, 1923 to December 31, 1923.

Gage. Stevens continuous water-stage recorder on left bank in wooden well and shelter, attended by students or faculty of University of North Carolina at Chapel Hill.

DISCHARGE MEASUREMENTS. Made from cable 75 feet upstream from gage. CHANNEL AND CONTROL. Creek is straight for 150 feet upstream and for about 700 feet downstream; bed of stream shifting sand and current is sluggish at low water. Both banks are high and wooded but subject to overflow at extreme high water. Control consists of large boulders and gravel about 40 feet downstream from gage; probably permanent.

EXTREMES OF DISCHARGE. Maximum stage during period, 6.50 feet at 7:15 a.m.

March 13 (discharge, 1,380 second-feet); minimum stage, 1.01 feet from 8 p.m.

July 27 to 3 a.m. July 28 (discharge, 2.5 second-feet).

ICE. Stage-discharge relation not affected by ice.

Accuracy. Stage-discharge relation permanent. Rating curve well defined up to 500 second-feet and fairly well defined between 500 and 1,000 second-feet. Breaks in record filled in by a rainfall run-off study. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting gage-height graph. Records considered good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF MORGAN CREEK NEAR CHAPEL HILL, N. C.

Week	1923	Week	1923	Week	1923	Week	1923
1	36 33 82 43 20 63 52 255 76 30	14	23 54 33 30 31 21 19 17 12 9	27	9 10 6 13 25 9 5 13 5 14 11 10	40	4 4 4 5 5 7 7 7 7 12 20 13 14

MONTHLY DISCHARGE OF MORGAN CREEK NEAR CHAPEL HILL, N. C. [Drainage area, 29 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1923		1			
January 20-31	71	14	31.1	1.07	.48
February	212	17	48.9	1.69	1.76
March	874	28	99:8	3.44	3.97
April	144	21	35.3	1.22	1.36
May	37	12	19.8	.683	.79
June	31	4.9	9.26	.319	.36
July	66	2.8	9.50	.328	.38
August	28	4.0	8.22	.283	.33
September	27	3 0	9.80	.338	.38
October	9	3.8	4.35	.150	.17
November	16	4.3	7.56	.261	.29
December	45	11	15.5	.534	.62

DEEP RIVER NEAR HIGH POINT, N. C.

LOCATION. At highway bridge about 11/2 miles northwest of Jamestown and 31/2 miles northeast of High Point, Guilford County.

Drainage Area. 33 square miles (measured on U.S. Department of Agriculture

soil survey maps).
RECORDS AVAILABLE. June 14 to December 31, 1923.

GAGE. Standard enameled staff in two sections on right bank about 20 feet upstream from highway bridge; read by W. S. Davis.

DISCHARGE MEASUREMENTS. Made from upstream side of bridge; for low water by wading section under bridge.

Channel and Control. Mostly sand. Control formed by loose rocks under lower side of bridge; sand between rocks washes away and is replaced frequently. Right bank is high but left bank is subject to overflow at about 7 feet gage height.

Extremes of Discharge. No record of floods has been obtained. Ice.—Not enough to affect stage-discharge relation.

DIVERSION. None.

Accuracy. Stage-discharge relation for low water changes frequently. Rating curve for medium and higher stages fairly well defined. Gage read to hundry the station of the station. Daily discharge to the station of the station of the station of the station. dredths once a day which was not sufficient for this station. Daily discharge ascertained by applying daily gage height to rating table. Records poor.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF DEEP RIVER NEAR HIGH POINT, N. C.

Week	1923	Week	1923	Week	1923
25	6.8	35	33.9	44	42.9
26	6.8	36	29.1	45	23.6
27	13.1	37	10.1	46	21.3
28	10.3	38	9.6	47	21.1
29	13.5	39	6.5	48	40.9
30	120.7	40	5.7	49	26.3
31	16.7	41	8.6	50	22.6
32	12.2	42	13.5	51	42.7
33	9.7	43	13.1	52	30.9
34	9.7				

MONTHLY DISCHARGE OF DEEP RIVER NEAR HIGH POINT, N. C. [Drainage area, 33 square miles]

		t			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
June 14-30. July. August. September. October November. December.	11 556 78 114 157 101 122	5.2 4.6 6.5 5.6 5.6 16 20	7.46 37.5 13.2 16.7 15.8 26.2 30.5	0.226 1.14 .400 .506 .479 .794	0.14 1.31 .46 .56 .55 .89 1.07

DEEP RIVER AT RAMSEUR

LOCATION. At upper end of long pool, 200 feet downstream from railroad station at Ramseur, Randolph County, the end of the Southern Railroad's branch line from Greensboro.

Drainage Area. 343 square miles (measured on U. S. Department of Agriculture

soil survey maps).

RECORDS AVAILABLE. November 24, 1922 to December 31, 1923.

Gage. Gurley 7-day graph gage in wooden stilling well and shelter on right bank,
5 feet from edge of water; attended to by J. M. Woodell.

DISCHARGE MEASUREMENTS. Made from cable 200 feet below gage.

CHANNEL AND CONTROL. Channel straight above and below for 700 feet. Bed, composed of boulders and sand; fairly smooth. Both banks are about 20 feet high but are overflowed occasionally. Control is a solid rock shoal about 600 feet downstream from gage. There are three small islands between the cable and control.

Extremes of Discharge. Maximum stage recorded during year, 19.22 feet at 1 p.m. March 13, 1923 (discharge, 16,600 second-feet), minimum stage recorded, 0.44 foot from 8 p.m. July 27, to 6 a.m. July 28, 1923 (discharge, 35

second-feet).

ICE. Negligible.

DIVERSIONS. None.
REGULATION. Daily graphs show continual regulation by power plants above; however no plant has more than ten hours storage, consequently weekly and

monthly mean flow is representative of natural flow.

Accuracy. Stage-discharge relation, except for low water, considered permanent.

A slight shift occurred during high water January 1. Rating curve used to that date is well defined between 40 and 125 second-feet and fairly well defined above. Curve since January 1 is well defined between 80 and 6,000 second-feet, and extended above. Operation of water-stage recorder satisfactory. Daily discharge ascertained by use of discharge integrator. As a result of measurements of extreme low water made late in 1925, the low water rating has been slightly changed. This results in making the smaller flows slightly too large as recorded in the following table.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF DEEP RIVER AT RAMSEUR, N. C.

	Year			Ye	ar
Week -			Week	1	
	1922	1923		1922	1923
1		701	27		
2		392	28		1;
3		194	29		90
4		683	30		4:
5		499	31		6
6		946	32		13
7		507	33		
8		228	34		
9		756	35		
		789	36		1
		427	37		1
2		1,131	38		1
3		329	39		1
		641	40		
5		815	41		
3		322	42		
,		337	43		
3		492	44		
)		217	45		1
)		311	46		
		431	47		
2	,	206	48	71	
3		128	49	104	2
		252	50	228	1
					1
3		104	51	450	
)		99	52	225	2

Monthly Discharge of Deep River at Ramseur, N. C. [Drainage area, 343 square miles]

		Discharges in Second-feet				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1 922		3				
November 24-30	84	50	71.1	0.207	0.05	
December	800	51	239.0	.697	.80	
1923						
January	1,780	120	497	1.45	1.67	
February	2,300	154	597	1.74	1.81	
March.	11,800	255	1,540	4.49	5.18	
April	2,500	150	551	1.61	1.80	
May	1,020	120	313	.913	1.05	
June	580	80	148	.431	.48	
July	3,250	50	455	1.33	1.53	
August	620	54	154	.449	.52	
September	460	45	137	.399	.45	
October	84	35	62	.181	.21	
November	405	54	112	.327	.36	
December	566	75	187	.545	.63	
The year	11,800	35	396	1.15	15.69	

DEEP RIVER AT CUMNOCK, N. C.

LOCATION. At Southern Railway bridge, 300 yards northwest of the railroad station at Cumnock, Lee County.

Drainage Area. 1,110 square miles.

RECORDS AVAILABLE. July 1, 1900 to June 28, 1902, when the station was discontinued.

GAGE. Wire gage nailed to guard rail of bridge; read by J. A. Rollins.

DISCHARGE MEASUREMENTS. Made from bridge to which gage is attached.
CHANNEL AND CONTROL. Bed of stream muddy with some boulders. Channel straight for several hundred feet above and below bridge but current is rather

sluggish during low water. Control not known. Extremes of Discharge. Maximum stage recorded, 36.03 feet March 26, 1901 (discharge, 27,100 second-feet); minimum stage recorded, 0.85 feet August 19, 1900 (discharge, 72 second-feet).

ICE. Stage-discharge relation not affected by ice.

REGULATION. Diurnal regulation by mills above; no plant has more than 10 hours

storage.

Accuracy. Stage-discharge relation permanent. Rating curve well defined throughout. Gage read to hundredths. Daily discharge ascertained by applying daily gage height to rating table. Records good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF DEEP RIVER AT CUMNOCK, N. C.

		Year			Year			
Week	1900	1901	1902	Week	1900	1901	1902	
1		914	5,330	27		707		
2		1,101	256	28		4,102		
3		1,101	811	22		5,364		
4		351	492	30	363	516		
_		829	7.159	31	154	377		
		1,045	4,324	32	113	7,385		
		505	393	33	119	5,636		
7		293		34	153			
8		293	3,281	35		3,566		
9			9,146	36	188	2,462		
0		242	2,806		130	737		
1		343	429	37	676	411		
2		1,001	249	38	309	5,222		
3		15,184	165	39	141	525		
4		3,689	213	40	99	427		
.5		1,063	411	41	151	572		
6		1,798	320	42	196	439		
7		689	231	43	121	336		
.8		132	229	44	750	320		
9		149	203	45	447	265		
20		209	230	46	137	283		
21			336	47	163	288		
22		2,117	456	48	178	305		
23		571	353	49	1,525	298		
24		2,674	279	50	186	1,071		
5		2,321	382	51	1,052	598		
6		3,468		52	942	5,274		

MONTHLY DISCHARGE OF DEEP RIVER AT CUMNOCK, N. C. [Drainage area, 1,110 square miles]

	1 2	Discharges in	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1900		1 1 4			7
August	394	72	138	0.125	0.14
September	3,990	100	308	0.280	0.31
October.	274	80	139	0.126	0.15
November	4,550	106	368	0.335	0.37
December	5,190	126	878	0.798	0.92
1901	0,100	120		0.100	0.02
January	4,830	250	827	0.752	0.87
February	2,990	262	656	0.596	0.62
March	27,100	181	3,564	3.24	3.74
April	9,075	95	1,958	1.78	1.99
May	6,820	80	989	0.899	1.04
June	9,918	334	2,129	1.94	2.16
July	13,540	322	2,500	2.27	2.62
August	14,135	322	4,179	3.80	4.38
September	10,950	298	1,805	1.64	1.83
October	1,125	322	434	0.395	0.46
November	334	250	286	0.260	0.29
December	16,696	274	1,824	1.66	1.91
The year	27,100	80	1,763	1.60	21.91
1902					
January	12,268	126	1,653	1.50	1.73
February	15,200	238	4,597	4.18	4.35
March	10,908	160	2,058	1 .87	2.16
April	466	134	286	0.260	0.29
May	454	181	276	0.251	0.29
June 1-28	466	214	309	0.281	0.29

DEEP RIVER AT MONCURE, N. C.

LOCATION. At the covered wagon bridge of the Seaboard Airline Railroad, about one-fourth mile south of Moncure, Chatham County, and about 2 miles above the junction with the Haw River forming the Cape Fear.

Drainage Area. 1,400 square miles.

Records Available. May 5, 1898 to December 31, 1899, when station was discontinued.

Continued.

Gage. Wire gage fastened to guard rail of bridge; read by M. A. Moore.

DISCHARGE MEASUREMENTS. Made from bridge to which gage is attached.

CHANNEL AND CONTROL. Bed of stream shifting during high water. Channel straight for some distance above and below station. Control not known.

Both banks low and subject to overflow.

Extremes of Discharge. Maximum stage recorded, 25.92 feet February 8, 1899 (discharge, 24,600 second-feet); minimum stage recorded, 0.63 foot December 20, 1899 (discharge, 180 second-feet).

ICE. Stage-discharge relation not affected by ice.

REGULATION. Diurnal fluctuations from power plants above; no plant has more

then 10 hours storage.

Accuracy. Stage-discharge relation fairly permanent. Rating curve poorly defined. Gage read once daily. Daily discharge ascertained by applying daily gage height to rating table. Records poor.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF DEEP RIVER NEAR MONCURE, N. C.

	Yea	r		Year	
Week	1898	1899	Week	1898	1899
1		1,881	27	1,321	646
2		4,653	28	592	357
3		4,863	29	658	247
4		1,131	30	676	1,115
5		2,334	31	368	1,625
6		17,786	32	283	1,160
_		7,679	33	3,859	272
8		8,491	34	8,131	221
9		7,726	35	1,859	236
10		9,429	36	4,365	223
11		9,701	37	710	741
12		6,549	38	317	291
40		5,210	39	1,872	308
14		5,464	40	453	1,427
15		4,546	41	326	1,853
16		1,434	42	568	261
17		1,688	43	1,416	225
18		690	44	1,451	2,545
19	771	3,374	45	833	476
20	475	2,629	46	971	255
21	1,859	744	47	1,576	243
22	387	713	48	706	650
23	290	525	49	3,264	356
24	300	1,156	50	703	1,470
25	526	336	51	634	269
26	313	365	52	746	248

MONTHLY DISCHARGE OF DEEP RIVER NEAR MONCURE, N. C. [Drainage area, 1,400 square miles]

		Discharges in Second-feet					
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches		
1898							
May 5-31	4,120	322	898	0.641	0.64		
June	825	254	355	.254	.28		
July	5,300	254	769	.549	.63		
August	17,000	238	3,160	2.26	2.61		
September	10,100	238	1,790	1.28	1.43		
October	6,200	270	969	.692	.80		
November	3,740	405	1,110	.793	.88		
December	6,800	405	1,240	.886	1.02		

MONTHLY DISCHARGE OF DEEP RIVER NEAR MONCURE N. C .- Continued

		Discharges in	Second-feet			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off In Inches	
1899						
January	10,700	430	2,900	2.07	2.39	
February	24,600	2,320	10,100	7.21	7.51	
March	20,800	1,660	7,560	5.40	6.23	
April	15,700	900	3,250	2.32	2.59	
May		405	1,730	1.24	1.43	
June		304	633	.452	.50	
July	3,940	222	687	.491	.57	
August	2,220	194	638	.456	.53	
September	2,600	194	378	.270	.30	
October	4,800	208	873	.624	72	
November	10,300	208	911	.651	.73	
December	3,650	180	571	.408	.47	
The year	24,600	180	2,519	1.80	23.97	

CAPE FEAR RIVER AT FAYETTEVILLE, N. C.

LOCATION. At steel highway bridge, 700 feet upstream from Atlantic Coast Line Railroad bridge, I mile from center of Fayetteville, Cumberland County, on road to Raleigh, 6 miles above Rockfish Creek, 22 miles below mouth of (lower) Little River, 41 miles above lock at Browns Landing and 45 miles below junction of Deep and Haw rivers forming Cape Fear River.

Drainage Area. 4,290 square miles. Records Available. January 1, 1889 to August 24, 1917.

GAGE. Chain gage attached to downstream handrail of highway bridge; read by Frank Glover. Original gage was a vertical staff attached to right side of first pier from left end of bridge which was then a wooden structure. This bridge was burned and was later replaced by a 5-span steel bridge on same piers. Datum of two gages supposed to be the same.

DISCHARGE MEASUREMENTS. Made from downstream side of bridge to which gage is attached.

CHANNEL AND CONTROL. Bed of river composed largely of hard marl; fairly permanent. Channel straight for long distance above and below gage. Both banks high and steep; overflowed at about stage 64.0 feet. Low water control may be loose rock wing dams some distance downstream; high water control not apparent. After August 24, 1917, when lock at Brown's Landing was put in operation low water became affected by lock.

Extremes of Discharge. 1889-1917: Maximum stage recorded, 68.7 feet in early morning August 29, 1908 (discharge, 88,000 second-feet); minimum stage recorded, 0.2 foot October 8 and 9, 1897 (discharge, 295 second-feet).

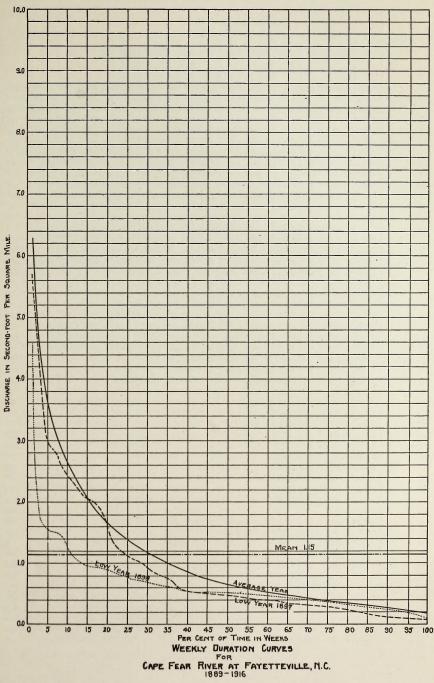
ICE. Stage-discharge relation not affected by ice.

REGULATION. Considerable fluctuation at low stages due to operation of Buckhorn power plant 50 miles upstream and also by plants on tributaries.

ACCURACY. Stage-discharge relation permanent but affected by variations in slope

with rate of change in stage. Rating curve fairly well defined up to 80,000 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

Cooperation. Gage-height record furnished by U. S. Weather Bureau.



MEAN WEEKLY DISCHARGE, IN SECOND-FEET

							Ye	ear						
Week	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902
1	14,606	2,896	3,466	3,676	6,489	3,129	2,751	5,560	2,210	1,651	2,259	1,749	3,883	13,391
2	12,073	1,991	7,733	4,260	1,931	15,757	39,424	1,717	1,687	1,357	7,167	5,503	3,444	2,777
	16,457	1,623		23,859	1,511	6,079		8,400	3,419	1,414	9,097	5,234	4,449	2,141
	20,357	1,603	9,299	20,566	2,056	2,960	9,301	11,041	8,093	3,141	2,894	3,953	2,117	6,716
5		1,836	6,626	4,854	9,520	6,224	18,857	5,863	7,216	2,376	5,664	1,999		17,261
6	4,884	4,463	7,667	4,039	4,346	5,943	8,643	37,471	18,657	1,403		3,451		12,001
	10,631	4,979	5,309	3,789	34,243	11,077	4,636	11,087	8,793		14,947	21,271	3.386	
9	34,343 9,409	4,293 12,366	17,386 7,370	3,433 11,169	15,204 $7,280$	7,431 14,467	10, 173 7, 699	4,213 3,763	12,429 8,756		28,086 17,211	8,830 15,890	1,714	10,030 $34,271$
10	2,369	5,106	8,583	4,954	5,181		12,889	2,380			17,657	9,513	1,277	11,694
11	7,224	4,864	23,149	3,640	2,950		16,329		26,843		19,309	7,940	1,683	5,839
12	5,881	7,713	10,731	3,864	2,833		22,420	3,707	9,626	1,996		4,881	1,457	5,747
13	4,570		16,566	5,619	2,730	2,987		2,677	3,499	4,609	9,127	5,524	17,233	6,440
14	3,279	3,393	10,093	6,221	2,123	2,019	4,916	7,156		7,480	10,483	3,607	27,119	4,359
15	2,684	3,411	6,146	15,907	1,830		29,251		12,581	3,131	14,969	5,629	5,566	9,870
16	7,814	5,373	5,087	6,093	2,434	1,897	18,020	1,734	3,903	1,903	4,317	19,177	6,723	4,273
17	6,803	3,624	3,809	7,084	1,647	1,781	9,233	1,889	2,157	3,474	4,057	16,851	5,601	2,486
18	4,604	3,371	2,371	2,969	9,416	1,283	27,714	3,429	4,544	2,313	2,677	3,297	1,886	2,393
19	2,393	5,036	2,467	2,887	6,357	2,874	7,904	1,581	2,119	2,260	5,181	2,063	2,927	1,790
20	1,411	3,294	4,660	3,229	2,247	1,673	4,537	950	5,233	1,766	5,329	3,176	2,487	2,350
21	1,169	2,219	5,396	4,999	1,369	3,509	4,189	4,817	1,736	2,964	2,229		37,311	1,886
22	10,099	3,490	28,640	3,110	2,366	2,009	3,154	2,130	2,321	1,600	2,250		12,043	1,449
23 24	5,506	2,044	6,556	6,359	6,256	1,007	1,624	6,391	2,417	704	1,950	1,151	2,573	915
25	2,546 3,283	3,621 2,556	5,016 3,221	3,577 4,056	2,643 4,554	696	3,604	3,067	1,470	749	3,583	1,218	3,523	866
26	12,477	1,473	2,247	7,960	2,123	849 802	2,943 3,667	2,066 3,527	1,330 1,419	2,083 872	1,366	3,586	8,901	2,149
	31,486	1,817	3,443	7,823	1,860	2,164	5,177	2,696	1,102	2,860	1,139 1,877	5,259 1,351	5,061 2,756	1,633 866
28	4,349	929	3,849	5,333	861	971	1,996	36,371	2,430	3,984	2,324	940	6,666	1,032
29	4,753	941	2,567	5,587	829	931	2,194	4,663	5,139	2,079	1,224		26,586	786
30		4,689	5,660	2,559	601	3,586	6,070	2,577	4,524	2,363	3,118	2,259	4,827	584
		10,980	13,157	2,014	1,726	5,260	1,827	1,363	1,479	2,321	3,979	1.277	1,729	817
32	20,800	10,491	7,309	1,711	2,236	16,949	1,499	921	2,063	1,308	2,423		26,453	799
33	5,387	6,531	2,696	830	623	4,129	6,271	1,266	1,119	5,031	1,191		25,136	969
34		11,269	22,991	967	1,849	2,523	4,431	1,008	1,906	19,633	1,171	924	13,420	906
	13,614	6,054	22,071	2,026	10,930	3,003	2,284	817	1,224	3,837	814	920	8,243	568
36	3,694	2,443	6,976		11,469	1,514	1,446	1,890	891	6,551	696	707	3,404	429
37	2,913	5,956	4,771	861	15,551	946	1,596	908	467	2,591	1,461	420	1,736	1,277
38	2,764	8,767	2,201	1,371	5,070	2,623	877	1,015	486	1,107	1,003		23,207	475
39 40	3,289	2,756	1,923	1,751	1,921	4,327	623	1,940	486	4,061	1,192	509	4,621	1,914
41	2,017 1,626	3,016	1,899	826	2,666	5,020	493	10,211	394	1,154	1,741	459	4,039	1,803
42	1,026	1,674 4,049	2,790 $3,276$	589 533	2,589	26,424	709	1,143	352	1,239	5,123	556	2,139	2,169
43	4,054	7,457	1,883	497	7,263 $22,724$	6,176 2,639	634 571	2,264 1,224	344 731	1,066	1,246	759	2,563	1,639
44	7,456	3,604	1,414	526	4,153	6,596	1,561	1,026	2,016	2,683 3,530	860 5,747	444 479	1,506 1,397	768 858
45	3,126	3,767	1,403	1,091	2,356	5,711	1,591	6,054	1,571	1,803	2,759	2,944	1,397	1,015
46	3,277	3,760	1,636	2,044	2,470	2,721	2,393	1,751	824	2,290	1,620	801	1,363	833
47	13,947	2,743	1,726	2,101	1,954	2,377	1,176	1,323	696	4,126	1,386	520	1,519	1,769
48	11,701	2,014	3,699	901	3,354	1,911	1,373	2,470	1,294	2,121	3,001	939	1,777	4,407
49	3,113	2,033	3,457	808	6,824	1,954	1,117	6,181	1,856	6,439	2,369	4,073	1,500	9,626
50	2,413	2,374	3,303	931	4,863	6,067	3,880	4,579	1,300	2,220	3,183	1,413	2,600	4,840
51	1,813	6,760	3,247	4,137	10,261	2,659	3,026	4,554	1,691	2,217	1,919	3,130	3,941	4,629
52	1,664	6,279	3,229	2,441	2,791	3,086	3,135	2,104	3,330	2,371				

OF CAPE FEAR RIVER AT FAYETTEVILLE, N. C.

							Year								, sk
1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	Week
10,427	1,294	3,259	21,074	2,489	15,397	4,021	1,301	12,290	5,494	3,250	14,573	7,524	3,341	2,444	1
5,304	1,320	13,114	7,367	1,811	24,271	2,727	1,719	3,857	5,999	2,344	4,624	18,743	4,140	2,959	
3,044	1,311	6,320			10,794	6,419	1,413	2,731	5,133	1,484		21,929	3,954	3,371	3
4,687	4,313		10,466	1,480		2,863	5,049	2,579	4,247	9,476		12,490	2,483	3,947	
3,243	2,573		13,116	1,926	6,324	2,370	6,149	2,376	8,779	13,669			11,919	8,674	
17,123	6,729	4,060	7,687	4,766	4,414	4,290	2,627	5,691	3,303	3,344	6,309	9,431	17,636	3,284	1
19,371	3,137	20,057	1,074	3,467	13,997	6,833	6,616	6,349	9,373	4,643	4,871	4,220	3,719	2,716	
12,117	16,521	29,064	4,557	5,540	11,300	8,543	6,607	2,791			20,951	4,451	2,539	9,123	
12,347 5,823	7,739 9,346	10,490 4,754	3,657 5,634	11,524 4,663	5,008 3,764	6,843 4,120	8,483 4,849	5,624	10,271 16,683	8,040 4,136	10,591 7,221	5,760 6,999	5,044 5,966		
8,344	4,841	11,063		10,267	8,756	3,270	4,666			16,204	6,749	3,481	3,031	5,176	
21,766	3,049		11,463	4,033	17,569	2,491	2,287		18,350		5,857	3,803	2,294	8,389	
26,300	6,517		13,269	2,164	19,431	4,467	1,899		13,703	6,724	4,426	2,399	2,066		
13,231	2,119	5,580		5,327	7,661	3,093	1,693	2,936	8,289	5,330	5,406		5,369	1,060	
10,924	2,009	9,126	3,550	5,424	2,944	2,933	1,495	5,767	4,306	7,990	4,397	7,187	9,676		
10,241	1,656	11,234	3,447	2,507	5,199	4,206	9,310	4,341	3,844	5,646	6,471	3,380	2,364	4,044	
13,204	1,841	4,481	2,061	10,651	3,201	2,364	2,771	2,704	13,887	2,410	3,624	2,879	1,806	2,811	17
5,696	2,026	4,750	1,916	5,356	2,704	15,229	2,021	2,094	4,736	1,966	2,101	2,146	1,497	3,270	18
2,459	2,156	14,800	2,246	4,950	2,310	4,156	6,404	1,466	10,540	1,509	2,119	4,711	1,138	6,324	19
1,854	2,386	10,294	1,306	2,536	1,497	2,117	2,056	2,527	10,371	1,331	1,370	3,331	5,193	2,299	20
1,584	1,827	2,947	1,064	1,633	3,114	7,847	2,143	1,139	3,280	2,056	958		4,516		
1,826	1,251	12,783	2,090	6,033	1,490	2,629	1,381	951	2,496	3,124	944		2,907	1,486	
3,657	1,640	3,306	1,864	6,360	2,784	13,407	2,079	807	4,410	1,893	876				
2,974	2,967	3,087	2,613	9,599	2,293	4,530	16,727	1,273	6,074	2,396	1,270		5,647	8,629	
2,663	1,878	2,311	6,273	2,587	2,074	5,253	7,420	1,401	3,569	1,546	1,480		8,673		
3,684	3,546	1,483	8,374	5,554	2,089	4,031	3,219	1,069 813	2,420	4,861	1,356		3,967		
3,619 $2,757$	2,014 3,085	3,143 $10,610$	2,334 3,536	3,439 2,074	2,467 2,174	5,883 2,206	1,631 3,324	750	2,257 2,737	2,351 1,340	1,736 1,981	1,384	4,613 1,830		
2,137	1,384	9,057	3,024	2,506	2,593	2,579	4,104	1,450	2,276	1,408	1,640		2,824		
874	4,623	5,320		1,359	2,116	1,817	1,709	943	1,698	2,657	767	2,266			
981	3,414	2,299		1,634	4,341	18,884	1,533	741	813	5,040	692				
1,641	10,236			1,459	4,359		2,706	1,951	804	4,653	934	1	3,947	1	
2,166	7,456			2,063	2,210			1,234	678	2,283	911	1,753	2,057		
1,446	1,713	3,680	12,533	3,754	18,329	2,149	2,657	921	826	1,301	658	1,570	1,661	1,592	34
841	5,069	3,890	28,200	1,059	59,986	1,754	2,541	5,355	878	1,305	2,017	5,699	3,490		. 35
805	5,890	6,706		6,753	15,459	1,369	4,614	4,113	900	6,831	1,023		1,717		. 36
	12,110	2,203	1	1,714	6,296		2,394	1,264	687	1,414	790				. 37
1,879		1,779	2,537	891	2,173	2,491	1,301	878	645	2,354	1,016		1,283		. 38
729	2,149	1,329		1,759	1,870		1,093	1,379	2,369	2,136	1,039	821	866		. 39
521	1,277	814	2,017	1,566	1,864	909	956	871	932	1,973	769				40
680 1,626	1,031 1,023	1,021 1,036	1,546 1,829	554	1,564	850	4,099	801	680 763	1,871 1,341	750 1,237		911		41
1,709	2,957	940		606 546	1,414 2,004	1,111	3,399 5,046	2,418 2,107	813	4,871	973		1,161 1,551		42
1,131	1,520			649	5,041	1,198	1,651	1,569	670	2,621	839		1,194		44
1,301	6,994	1,207		808	2,113	993	1,579	4,769	2,813	6,340	778		741		45
976		920	1	1,010	6,337	911	1,246	4,197	1,707	4,924	2,886	1	1		46
1,341	3,169	1,122		6,133	2,846		1,180	2,589	1,164	2,031	2,919		986		47
920				7,743	2,257	875	1,048	2,863	1,014	1,523	1,346		936		48
870		3,339		2,291	2,190		2,819	2,070	1,420	4,994	6,409		1,027		49
1,112		4,184	2,061	13,791	3,321	2,176	2,124	1,583	1,240	2,261	5,346		1,661		. 50
1,987	4,403			11,080	3,984	1,881	1,571	11,250	950	1,746	4,541	4,110	1,677		51
2,124	3,805	14,266	2,644	12,935	16,293	1,374	4,521	16,139	2,020	8,271	22,474	2,916	1,954		52

Monthly Discharge of Cape Fear River at Fayetteville, N. C. [Drainage area, 4,290 square miles]

	I	Discharges in	Second-feet	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1889	D4 C00	9.770	17 000	0.71	4.28
January	34,600 41,900	3,550 4,390	15,900 15,100	3.71	3.66
February	13,800	2,070	5,200	1.21	1.40
March	12,800	1,980	5,210	1.21	1.3
April	6,150	1,070	2,040	.476	.58
May June	37,400	1,980	6,480	1.51	1.68
July	45,000	2,890	17,400	4.06	4.68
August	43,700	2,470	14,200	3.31	3.82
September	7,610	2,220	3,440	.802	.89
October	18,100	1,140	3,280	.765	.88
November	26,500	2,780	7,490	1.75	1.98
December	7,610	1,580	2,490	.580	.67
The year	45,000	1,070	8,186	1.91	25.83
1890	0.000	1 710	1.000	0.404	
January	3,280	1,540	1,990	0.464	0.5
February	12,800	1,800	4,880	1.14	1.1
March	16,100	3,110	7,050	1.64	1.8
April	8,000	2,570	3,890	.907	1.0
May	8,080	1,340	3,610	.841	.9'
June	5,450	1,100	2,470	.576	.6
July	12,800	550	2,700	.629	.73
August	17,600	3,670	8,920	2.08	2.4
SeptemberOctober_	24,200	1,540	5,210	1.21	1.3
November	15,700	1,340	4,020	.937	1.0
December	4,270 13,000	1,620 1,800	3,140 4,300	.732 1.00	1.1
The year	24,200	550	4,348	1.01	13.70
1891					
January	14,000	3,000	6,620	1.54	1.78
February	36,300	3,550	9,490	2.21	2.30
March	38,900	4,900	13,700	3.19	3.6
April	12,800	2,670	6,270	1.46	1.6
May	45,200	1,840	8,140	1.90	2.1
June	25,700	1,580	5,580	1.30	1.4
July	8,480	1,840	3,830	.893	1.0
August	42,000	2,020	14,200	3.31	3.8
September	19,300	1,800	4,690	1.09	1.2
October	4,270	1,380	2,360	.550	.6
November	4,900 6,940	1,220 2,780	1,720 3,520	.401	.9
The year	45,200	1,220	6,677	1.56	21.1
5 000	10,200	1,220	0,077		21.1

MONTHLY DISCHARGE OF CAPE FEAR RIVER AT FAYETTEVILLE, N. C.—Continued

	1	Discharges in	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1892					
January	52,200	3,000	12,400	2.89	3.33
February	17,700	3,000	4,590	1.07	1.15
March	19,400	2,890	5,660	1.32	1.52
April	29,400	3,440	8,140	1.90	2.12
May	7,920	2,370	3,430	.800	.92
June	12,800	1,940	5,270	1.23	1.37
July	10,500	1,540	5,120	1.19	1.37
August	2,520	440	1,460	.340	.39
September	3,220	465	1,330	.310	.35
October	1,000	440	606	.141	.16
November	3,550	440	1,450	338	.38
December	7,920	700	2,010	.469	.54
The year	52,200	440	4,289	1.00	13.60
January	16,600	1,140	3,910	0.911	1.05
February	40,800	2,780	14,900	3.47	3.61
March .:	13,600	2,070	4,280	.998	1.15
April.	3,500	1,420	2,050	.478	, .53
May	25,800	1,140	4,580	1.07	1.23
June	16,700	1,340	3,850	.897	1.00
July.	2,270	520	1,020	.238	.27
August	19,100	550	2,710	.632	.73
September	36,000	1,380	9,150	2.13	2.38
October	40,400	1,380	8,540	1.99	2.29
November	6,780	1,760	2,500	.583	.65
December	19,200	2,370	5,910	1.38	1.59
The year	40,800	520	5,283	1.23	16.48
January	20,300	2,520	6,910	1.61	1.86
February	21,500	3,550	7,960	1.86	1.94
March	21,700	2,470	5,840	1.36	1.57
April	3,910	1,340	2,060	.480	.54
May	5,170	1,220	2,300	.536	.62
June	3,110	490	980	.228	.25
July	7,760	670	1,850	.431	.50
August	29,600	1,380	6,980	1.63	1.88
September	10,100	610	2,320	.541	.60
October	49,600	2,120	9,770	2.28	2.63
November	12,800	1,800	3,700	.862	.96
December	11,400	1,580	3,320	.774	.89
The year	49,600	490	4,499	1.05	14.24
				=====	

MONTHLY DISCHARGE OF CAPE FEAR RIVER AT FAYETTEVILLE, N. C.—Continued

	I	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1895					
January	67,200	2,420	16,100	3.75	4.32
February	21,500	4,030	9,530	2.22	2.31
March	38,900	4,390	14,000	3.26	3.76
April	49,300	3,790	15,700	3.66	4.08
May	44,400	3,060	9,350	2.18	2.51
June	6,290	1,540	2,780	.648	.72
July	13,800	1,620	3,790	,883	1.02
August	13,000	1,180	3,420	.797	.92
September	1,980	580	1,180	.275	.31
October	790	415	604	.141	.16
November	4,090	1,070	1,740	.406	.45
December	11,400	1,000	2,700	.629	.73
The year	67,200	415	6,741	1.57	21.29
1896 January	19,200	1,540	6,390	1.49	1.72
February	49,800	2,720	14,200	3.31	3.57
March	5,450	2,120	3,300	.769	.89
April.	15,400	1,340	3,180	.741	.83
May	10,500	825	2,740	.639	.74
June	12,800	1,040	3,540	.825	.92
July	52,200	1,300	10,600	2.47	2.85
August	1,660	610	1,090	.254	.29
September	4,450	440	1,380	.322	.36
October		825	3,180	.741	.85
November		965	2,470	.576	.64
December	8,720	1,890	4,360	1.02	1.18
The year	52,200	440	4,702	1.10	14.84
January	17,000	1,540	3,720	.867	1.00
February	32,500	2,220	12,900	3.01	3.13
March	34,000	3,110	12,100	2.82	3.25
April	21,900	1,710	6,910	1.61	1.80
May	10,500	1,540	3,240	.755	.87
June	3,910	730	1,800	.420	.47
July	18,400	760	3,180	.741	.85
August	2,890	860	1,540	.359	.41
September	1,800	315	632	.147	.16
October	860	295	483	.113	.13
November	4,580	610	1,260	.294	.33
December	4,770	1,140	2,110	.492	.57
The year	34,000	295	4,156	.97	12.97

MONTHLY DISCHARGE OF CAPE FEAR RIVER AT FAYETTEVILLE, N. C.-Continued

		Discharges i	in Second-fe	eet	,
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1898					
January	7.610	1.260	2,000	0.466	0.54
February	2,470	860	1,580	.368	.38
March	13,300	1,220	3,200	.746	.86
April	14,300	1,500	4,340	1.01	1.13
May	6,150	1,100	2,200	.513	.59
June	3,000	520	1,120	.261	.29
July	9,380	490	2,670	.622	.72
August	22,900	895	5,500	1.28	1.48
September	11,700	860	3,660	.853	.95
October	4,770	610	1,630	.380	.44
November	7,610	1,340	2,800	.653	.73
December	11,000	1,800	3,240	.755	.87
The year	22,900	490	2,828	.66	8.98
1899	10,000	1 700	F 100	1 10	1 07
January	16,600	1,760	5,120	1.19	1.37
February	56,500	4,770	23,200	5.41	5.63
March	40,400	3,970	16,300	3.80	4.38
April	31,100	2,780	8,390	1.96	2.19
May	10,400	1,620	3,580	.834	.96
June	5,520	965	2,130	.497	.55
July	6,710	895	2,220		.60
August	5,800	640	1,850	.431	.50
September	2,320	610 610	1,080		
October	10,100		2,130	.497	.57
November	14,200	1,260	3,070	.716	
December	7,610	1,540	2,790	.650	.75
The year	56,500	610	5,988	1.40	18.58
January	14,100	1,500	3,920	0.914	1.05
February	31,800	1,710	9,850	2.30	2.40
March	28,700	3,000	8,670	2.02	2.33
April	43,400	2,270	10,800	2.52	2.81
May	11,000	1,380	2,850	.664	.77
June	10,500	965	2,670	.622	.69
July	6,150	465	1,400	.326	.38
August	1,760	365	733	.171	.20
September	5,030	315	972	.227	.25
October	1,100	390	540	.126	.15
November	6,500	365	1,220	.284	.32
December	9,200	825	2,760	.643	.74
The year	43,400	315	3,865	.90	12.09

MONTHLY DISCHARGE OF CAPE FEAR RIVER AT FAYETTEVILLE, N. C.—Continued

	I				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inche
1901					
January	8,720	1,540	3,320	0.774	0.89
February		1,500	2,820	.657	.68
March	31,800	1,140	4,870	1.14	1.31
April	49,300	2,470	10,800	2.52	2.81
May	68,100	1,500	12,200	2.84	3.27
June	15,900	1,710	5,070	1.18	1.32
July	39,600	1,460	9,480	2.21	2.55
August	44,700	1,380	16,400	3.82	4.40
September	42,800	1,540	8,120	1.89	2.11
October	5,030	1,340	2,450	.571	.66
November	2,520	1,340	1,510	.352	.39
December	30,800	1,380	4,320	1.01	1.16
The year	68,100	1,140	6,780	1.58	21.55
January	21 100	2,070	6,130	1 40	1.05
	31,100			1.43	1.65
February		2,890	13,600	3.17	3.30
March	40,000	3,110	11,000	2.56	2.95
April	19,200	2,020	5,310	1.24	1.38
May	3,000	1,380	2,040	.476	.55
June	3,550	760	1,350	315	.35
July	1,710	490	841	.196	.23
August	1,300	550	837	.195	.22
September		365	988	.230	.26
OctoberNovember	3,550	670	1,520	.354	.41
		700	1,450	.338	.38
December	14,400	2,120	5,750	1.34	1.54
The year	40,000	365	4,235	.99	13.22
January	17,700	2,270	5,640	1.31	1.51
February		2,780	13,000	. 3.03	3.16
March		3,110	15,300	3.57	4.12
April	35,700	4,330	12,700	2.96	3.30
May	8,160	1,420	2,420	.564	.65
June	7,610	1,420	3,170	.739	.82
July		610	2,270	.529	.61
August		700	1,490	.347	.40
September		580	1,180	.275	.31
October		440	1,160	.270	.31
November		825	1,130	.263	.29
December	4,390	790	1,500	.349	.40
The year	54,000	440	5,080	1.18	15.88

MONTHLY DISCHARGE OF CAPE FEAR RIVER AT FAYETTEVILLE, N. C.—Continued

]	Discharges in	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1904					
January	8,400	1,100	2,110	0.492	0.57
February	29,100	2,220	8,050	1.88	2.03
March	18,100	2,470	6,010	1.40	1.61
April	4,030	1,300	2,020	.471	.53
May	3,670	895	1,920	.448	.52
June	11,400	760	2,240	.522	.58
July	7,610	790	2,940	.685	.79
August	19,400	1,500	5,940	1.38	1.59
September	53,100	1,460	9,430	2.20	2.46
October	5,450	790	1,590	.371	.43
November	21,300	1,300	5,450	1.27	1.42
December	10,100	1,980	4,380	1.02	1.18
The year	53,100	760	4,340	1.01	13.71
1905	20.200	2.070	0.110	1 12	4 04
January	23,200	2,370	6,110	1.42	1.64
February	47,200	2,370	15,300	3.57	3.72
March	15,100	3,380	6,320	1.47	1.70
April	19,500	2,020	7,350	1.71	1.91 2.47
May	20,300	2,470	9,180	2.14	.87
June	11,900 30,700	1,300 1,040	3,330 6,540	1.52	1.75
July	39,500	1,040	9,750	2.27	2.62
September	10,300	1,100	2,950	.688	.77
October -	1,340	730	981	.229	.26
November	1,760	790	1,150	.268	.30
December	29,100	1,300	7,510	1.75	2.02
The year	47,200	730	6,373	1.48	20.03
1906 January	35,300	3,000	11,800	2.75	3.17
February	17,000	3,550	7,210	1.68	1.75
March	24,000	3,160	7,370	1.72	1.98
April	31,100	1,710	5,660	1.32	1.47
May	3,550	1,000	1,740	.406	.47
June	11,500	1,420	3,500	.816	.91
July	21,100	1,500	5,440	1.27	1.46
August	38,200	1,980	12,000	2.80	3.23
September	35,400	1,500	5,560	1.30	1.45
October	5,590	1,140	2,100	.490	.56
November	1,890	1,140	1,410	.329	.37
December	8,000	1,070	2,440	.569	.66
The year	38,200	1,000	5,519	1.29	17.48

MONTHLY DISCHARGE OF CAPE FEAR RIVER AT FAYETTEVILLE, N. C.—Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907					
January	3,000	1,380	1,830	0.427	0.49
February	15,900	1,620	5,250	1.22	1.27
March	14,000	1,980	5,920	1.38	1.59
April	19,200	2,070	5,750	1.34	1.50
May	10,500	1,420	3,380	.788	.91
June	21,500	1,710	6,620	1.54	1.72
July	7,610	895	2,410	.562	.65
August	5,590	895	2,100	.490	.56
September	16,300	760	2,650	.618	. 69
October	2,940	415	794	.185	.21
November	19,500	520	3,530	.823	.92
December	33,500	2,020	9,360	2.18	2.51
The year	33,500	415	4,132	.96	13.02
1908			10.100	0.01	
January		2,570	12,500	2.91	3.36
February		3,550	9,070	2.11	2.28
March	40,000	3,060	11,500	2.68	3.00
April		2,420	4,720	1.10	1.23
May		1,340	2,310	.538	.62
June	4,770	1,180	2,240	.522	.58
July		1,140	2,510	.585	.67
August		1,420	18,000	4.20	4.84
September		1,380	7,880	1.84	2.05
October	10,100	1,300	2,110	.492	.57
November		1,580 1,760	3,610 6,490	.841 1.51	.94 1.74
The year	85,600	1,140	6,912	1.61	21.97
1909	85,000	1,140	0,912	1.01	21.97
January	10,700	2,120	3,870	.902	1.04
February	15,900	1,980	6,260	1.46	1.52
March	6,710	2,420	3,730	.869	1.00
April	8,080	2,070	3,130	.730	.81
May		1,540	7,280	1.70	1.96
June		1,890	6,430	1.50	1.67
July		1,000	3,160	.737	.85
August		1,000	10,000	2.33	2.69
September		930	1,820	424	.47
October		580	1,020	.238	.27
November		580	906	.211	.24
December	5,800	490	1,520	.354	.41
The year	49,200	490	4,094	.95	12.93

MONTHLY DISCHARGE OF CAPE FEAR RIVER AT FAYETTEVILLE, N. C.—Continued

		Discharges	in Second-fe	et	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1910					
January	10,800	825	2,950	.688	.79
February	10,400	2,270	5,180	1.20	1.25
March	15,100	1,710	4,430	1.03	1.19
April	20,300	965	3,730	.869	.97
May	13,800	1,140	2,970	.692	.80
June	35,300	895	6,900	1.61	1.80
July	8,000	965	2,630	.613	.71
August	6,360	1,070	2,550	.594	.68
September	7,080	930	2,490	.580	.65
October	14,100	825	3,200	.746	.86
November	1,890	825	1,340	.312	.35
December	8,400	965	2,700	.629	.73
The year	35,300	825	3,422	.80	10.78
1911					
January	24,200	1,760	5,060	1.18	1.36
February	17,100	1,620	4,300	1.00	1.04
March	11,400	2,070	4,680	1.09	1.26
April	10,800	2,020	3,860	.900	1.00
May	3,910	790	1,690	.394	.45
June	2,270	640	1,110	.259	.29
July	1,710	490	978	.228	.26
August	3,790	610	1,220	.284	.33
September	18,100	580	2,860	.667	.74
October	6,780	670	1,580	.368	.42
November	13,100	1,000	3,310	.772	.86
December	31,200	1,180	7,760	1.81	2.09
The year	31,200	490	3,201	.75	10.10
January	16,400	3,000	5,460	1.27	1.46
February	22,700	2,620	9,500	2.21	2.38
March	53,100	5,520	17,300	4.03	4.65
April	27,800	3,380	7,850	1.83	2.04
May	19,900	1,980	6,740	1.57	1.81
June	14,000	1,660	3,970	.925	1.03
July	3,280	790	2,170	.506	.58
August	1,260	520	805	.188	.22
September	3,280	465	1,120	.261	.29
October	1,420	520	786	.183	.21
November	7,160	490	1,590	.371	.41
December.	2,890	825	1,400	.326	.38
The year	53,100	465	4,891	1.14	15.46

MONTHLY DISCHARGE OF CAPE FEAR RIVER AT FAYETTEVILLE, N. C.—Continued

	Ι	Discharges in	Second-feet			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1913						
January	31,000	1,040	6,050	1.41	1.6	
February	9,380	2,070	4,420	1.03	1.0	
March	33,300	2,670	9,330	2.17	2.5	
April	20,300	1,800	5,650	1.32	1.4	
May	4,840	895	1,960	.457	.5	
June	8,080	1,000	2,570	.599	.6	
July	4,770	640	2,080	.485	.5	
August	13,600	760	3,010	.702	.8	
September	16,700	610	3,080	.718	.8	
October	9,650	700	2,380	.555	.6	
November	21,700	1,300	3,630	.846	.9	
December	13,000	1,340	4,260	.993	1.1	
The year	33,300	610	4,035	.94	12.7	
1914						
January	23,900	2,320	6,040	1.41	1.6	
February	35,000	3,500	9,710	2.26	2.3	
March	16,800	3,730	7,000	1.63	1.8	
April	11,000	2,470	4,870	1.14	1.2	
May	2,620	790	1,510	.352	.4	
June	2,670	520	1,230	.287	.:	
July	2,840	490	1,470	.343	.4	
August	3,440	415	1,060	.247	.:	
September	1,800	640	1,000	.233		
October	1,460	550	944	.220		
November	8,240	610	1,860	.434	.4	
December	38,900	1,000	9,550	2.23	2.5	
The year	38,900	415	3,854	.90	12.1	
January	33,800	3,330	14,400	3.36	3.8	
February	27,800	3,000	7,780	1.81	1.8	
March	10,700	1,980	4,150	.967	1.1	
April	25,100	2,320	7,030	1.64	1.8	
May	13,400	1,620	4,310	1.00	1.1	
June	37,700	1,220	7,610	1.77	1.9	
July	4,640	895	1,600	.373	.4	
August	11,700	700	2,830	.660	.7	
September	7,610	670	2,410	.562		
October	7,240	1,070	2,250	.524	.6	
November	4,330	965	1,540	.359	.4	
December	8,240	1,040	2,420	.564	.6	
The year	37,700	670	4,861	1.13	15.2	

MONTHLY DISCHARGE OF CAPE FEAR RIVER AT FAYETTEVILLE, N. C .- Continued

	1	1			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1916					
January	6,640	2,170	3,390	0.790	0.91
February	43,400	2,120	9,050	2.11	2.28
March	9,200	1,760	3,630	.846	.98
April	19,200	1,340	4,600	1.07	1.19
May	9,650	895	3,070	.716	.83
June	25,700	1,980	6,960	1.62	1.81
July	29,900	1,420	7,860	1.83	2.11
August	9,740	1,140	3,520	.821	.95
September	4,770	760	1,700	.396	.44
October	2,620	730	1,130	.263	.30
November	1,660	670	964	.225	.25
December	2,890	965	1,550	.361	.42
The year	43,400	670	3,952	.92	. 12.47
1917					
January	14,000	1,340	3,660	.853	.98
February	17,100	2,370	6,370	1.48	1.54
March	38,300	3,610	13,000	3.03	3.49
April	27,200	2,120	7,720	1.80	2.01
May	9,830	1,180	3,230	.753	.87
June	11,700	1,220	3,920	.914	1.02
July	25,700	2,320	8,430	1.97	2.27

YADKIN RIVER BASIN

YADKIN RIVER AT NORTH WILKESBORO, N. C.

- LOCATION. At new bridge (same location as old one washed out July 16, 1916), 3,780 feet below Southern Railway station at North Wilkesboro, Wilkes County.
- Drainage Area. 500 square miles.

 Records Available. April 10, 1903 to June 1, 1907; October 1, 1920 to December 31, 1923. Gage height record only, June 2, 1907 to June 30, 1909.

 Gage. Chain gage on downstream handrail; read by S. U. Reynolds. Original chain gage washed away with old bridge, July 16, 1916; original datum was
- DISCHARGE MEASUREMENTS. Made from bridge at gage.
- Channel and Control. Channel is straight above station, slightly curved at bridge and straight for 600 feet below. Current is swift. Right bank is low and subject to overflow but all water must pass under bridge and approaches. Left bank is high and rocky. Bed of stream is rocky with sand in places; one
- channel at all stages. Control is not perceptible.

 Extremes of Discharge. 1903-1907 and 1920-1923: Maximum stage recorded, 18.8 feet (datum of old gage) November 19, 1906 (discharge, 22,300 second-feet); minimum stage recorded, —0.6 foot January 26, 1905 (discharge, 184 secondfeet).
- Ice. Stage-discharge relation not affected by ice.
- REGULATION. Very slight regulation from small milldams upstream.
- Accuracy. Stage-discharge relation permanent since 1916 flood; shifted frequently before. Rating curve used since 1920 is well defined between 370 and 10,000 second-feet; extended above. Preceding curves fairly well defined for medium and low stages. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records 1903 to 1907 fair; 1920 to 1923 good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF YADKIN RIVER AT NORTH WILKESBORO, N. C.

					Year				
Week									
42	1903	1904	1905	1906	1907	1920	1921 .	1922	1923
				-					
1		434	647	1,749	1,861		760	515	1,147
2		457	1,367	1,215	1,310		1,303	693	578
3		397	648	1,119	1,201		1,264	762	498
4		536	460	3,840	1,090		1,282	872	726
56		432 661	497 484	1,879 1,180	1,040 1,033		1,327 1,814	999 1,247	979 965
7		476	788	1,180	961		1,439	1,388	903 871
8		807	1,839	1,044	933		1,276	914	607
9		658	1,164	1,349	1,374		1,025	1,365	694
10		1,941	942	1,340	1,183		927	1,464	1,268
11		763	820	1,447	1,167		897	1,620	3,096
12		846	698	1,501	976		959	1,135	1,379
13		812	646	2,033	920		935	1,969	754
14		628	673	1,401	1,117		898	1,417	783
15 16	2,289	661 526	1,302	1,439 1,356	1,079 940		803 1,759	1,061 1,084	941 819
17	1,910	594	648	1,060	1,723		1,593	1,084	671
18	1,720	897	649	1,173	1,134		1,551	2,146	665
19	1,560	1,301	1,087	1,527	961		1,251	1,381	640
20	1,443	2,361	1,923	857	871		1,077	2,069	1,115
21	1,330	909	826	892	853		1,085	1,374	899
22	1,470	1,515	629	885			891	1,406	1,181
23	2,459	1,170	479	1,242			972	1,823	693
24	1,196	977	466	3,510			810	1,379	607
25	926	800	988	1,977			681	1,137	566
26	1,100	1,566	620	1,244 1,319			801 645	897	548
27	1,200 978	967 767	1,069 4,220	1,319			887	1,159 1,486	485 529
29	807	572	1,058	2,044			747	1,659	640
30	693	1,528	614	2,001			631	1,017	420
31	984	1,002	651	2,364			546	951	697
32	751	1,272	1,664	1,297			616	805	622
33	919	940	1,225	2,779			750	893	450
34	585	1,366	821	2,119			509	741	517
35	636	713	623	3,976			522	713	470
36	611	850	1,375	2,051			436	613	512
37	583	611	571	1,620			557	550	434
39	752 543	468 442	532 444	2,031 2,787			468 568	492 478	446 611
40	519	416	449	3,771		1,111	481	513	366
41	1,326	387	816	1,751		547	366	1,335	338
42	690	378	457	5,219		515	371	595	350
43	529	372	476	2,047		486	366	512	409
44	515	420	444	1,541		515	1,805	492	356
45	650	535	436	1,370		472	564	478	726
46	584	538	436	1,370		1,013	489	507	335
47	532	416	429	5,513		563	589	461	370
48	491 494	387	419	1,559		1,185 1,279	687 718	458 513	533 908
50	494	596 432	1,269 929	1,361 1,353		2,489	515	555	908 498
51	546	432	1,764	1,413		1,232	807	748	498
52	504	626	799	1,764		1,146	596	604	478
	001	020	100	_,		, , , , ,			1.0

MONTHLY DISCHARGE OF YADKIN RIVER NEAR NORTH WILKESBORO, N. C. [Drainage area, 500 square miles]

And the second section of the second section is the second section of the second section in the second section is		Discharges in	Second-feet	t		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1903						
April 10-30	3,290	1,780	2,330	4.66	3.6	
May	1,780	1,240	1,490	2.98	3.4	
June	5,790	890	1,450	2.90	3.2	
July	1,990	668	911	1.82	2.1	
August	1,370	588	813	1.63	1.8	
September	1,490	510	641	1.28	1.4	
October	5,400	491	741	1.48	1.7	
November	1,140	454	563	1.13	1.2	
December	755	386	504	1.01	1.1	
1904 Topusay	710	309	452	0.904	1.0	
January	1,490	309	624	1.25	1.3	
March	5,730	510	1,040	2.08	2.4	
April	940	516	604	1.21	1.3	
May	9,250	516	1,330	2.66	3.0	
June	3,830	614	1,230	2.46	2.7	
July	5,680	516	993	1.99	2.2	
August	3,560	614	1.080	2.16	2.4	
September	1,850	422	601	1.20	1.3	
October	422	357	389	.778	.9	
November	1,120	378	469	.938	1.0	
December	1,360	378	515	1.03	1.1	
The year	9,250	309	777	1.55	21.2	
1905						
January	3,290	184	757	1.51	1.7	
February	2,860	336	984	1.97	2.0	
March	1,180	614	819	1.64	1.8	
April	2,940	564	833	1.67	1.8	
May	3,200	540	1,080	2.16	2.4	
June	1,850	422	623	1.25	1.4	
July	12,900	510	1,640	3.28	3 .7	
August	2,800	472	1,040	2.08	2.4	
September	5,100	436	722	1.44	1.6	
October	2,410	436	534	1.07	1.2	
November	454	402	432	.864	.9	
December	6,390	419	1,130	2.26	2.6	
The year	12,900	184	883	1.77	24.0	
January	11,600	588	2,010	4.02	4.6	
February	18,500	940	1,140	2.28	2.3	
March	3,650	940	1,560	3.12	3.60	
April	3,290	940	1,350	2.70	3.0	
May	3,830	716	1,080	2.16	2.49	
June	6,450	716	1,910	3.82	4.26	
July	4,010	940	1,660	3.32	3.88	
August	22,100	1,060	3,130	6.26	7.25	
September	5,580	1,430	2,200	4.40	4.91	
October	20,700	1,490	3,040	6.08	7.0	
November	22,300	1,250	2,390	4.78	5.38	
December	5,840	990	1,480	2.96	3.41	
The year	22,300	588	1,912	3.82	52.08	

Monthly Discharge of Yadkin River Near North Wilkesboro, N. C.—Continued

Month		1				
	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1907						
January	3,040	1.040	1,330	2.66	3.07	
February		890	1,010	2.02	2.10	
March	1,920	845	1,110	2.22	2.56	
April		845	1,220	2.44	2.75	
May		755	925	1.85	2.13	
1920						
October	2,370	452	649	1.30	1.50	
November	3,080	452	756	1.51	1.68	
December	7,240	618	1,490	2.98	3.4	
1921						
January	2,040	712	1,160	2.32	2.68	
February	3,160	946	1,440	2.88	3.00	
March		810	925	1.85	2.13	
April		760	1,270	2.54	2.8	
May	2,360	712	1,200	2.40	2.7	
June	1,220	532	820	1.64	1 8	
July	1,220	492	715	1.43	1.6	
August	1,220	452	599	1.20	1.3	
September		376	506	1.01	1.13	
October	6,180	358	614	1.23	1.4	
November	2,220	433	648	1.30	1.4	
December	1,590	472	664	1.33	1.5	
The year	6,180	358	880	1.76	23.80	
January	1 700	492	714	1.43	1.6	
February	1,700 2,290	760	1,150	2.30	2.40	
March	3,320	860	1,150	3.12	3.6	
April	1,920	860	1,200	2.40	2.6	
May	4,200	1,020	1,670	3.34	3.8	
June		810	1,320	2.64	2.9	
July		810	1,280	2.56	2.9	
August	1,280	664	828	1.66	1.9	
September	712	452	542	1.08	1.2	
October	3,930	395	717	1.43	1.6	
November	574	433	474	.948	1.0	
December		472	598	1.20	1.3	
The year	5,080	395	1,004	2.01	27 .2'	
. 1923	2.00	, in -	700	1 79	1 7	
January	2,920	472	763	1.53	1.7	
February	1,170	532	830	1.66	1.73	
March:1	7,000	574	1,530	3.06	3.5	
April	1,540	618	796	1.59	1.7	
May	2,360	574	905	1.81	2.09	
June	1,020	433	640	1.28	1.43	
July	964	376	543	1.09	1.2	
August	860	376	557	1.11	1.2	
September	1,380	358	492	.984		
October	532	290	361	.722	.8	
November	1,800 1,800	306 414	472 588	1.18	1.0	
The year	7,000	290	706	1.41	19.1	

YADKIN RIVER AT DONNAHA, N. C.

Location. One-fourth mile upstream from railroad station at Donnaha, Forsyth County, just below site of old toll bridge which was washed away by a flood in 1916, 6 miles downstream from Ararat River which enters from the left, 50 miles downstream from gaging station at North Wilkesboro, N. C., and 60 miles upstream from gaging station at Salisbury, N. C.

Drainage Area. 1,600 square miles.

RECORDS AVAILABLE. April 11, 1913 to September 30, 1923 when station was discontinued.

GAGE. Vertical gage in four sections on left bank, 150 feet downstream from left

end of remains of old toll bridge.

DISCHARGE MEASUREMENTS. Since July 1920 measurements have been made from a cable erected 400 feet upstream from gage by North Carolina Geological and Economic Survey. Prior to flood of July, 1916, measurements were made from the toll bridge. Bridge washed out in July, 1916. After that date no measurements were made until April 23, 1920, when a new bridge had been erected 1 mile downstream.

Channel and Control. Bed composed of sand and bedrock; probably permanent. Current slightly obstructed by two old steel trusses lying about opposite and 300 feet respectively, below gage. Obstruction probably permanent. Control is a rock ledge extending across river and forming a shoal 450 feet

below gage.

Extremes of Discharge. 1913-1923: Maximum stage recorded, 40.0 feet at 8 a.m. July 16, 1916 (determined by observer who measured from flood marks down to water surface at lower stage; (discharge not determined); minimum stage recorded, 4.65 feet at 4 p.m. September 30, 1914 (discharge, 678 second-feet).

ICE. Stage-discharge relation not affected by ice.

DIVERSIONS. None.

REGULATION. None except for a few small milldams on tributary streams.

Accuracy. Stage-discharge relation practically permanent. The remains of old bridge, which lodged below gage during flood of July, 1916, and changed the control, now seems to form a permanent part of control. Rating curves well defined for low water and fairly well defined to 15,000 second-feet.

Note. Observer faked gage height records at times. It is impossible to separate the false from the true, therefore the records have been discarded.

YADKIN RIVER NEAR SALISBURY, N. C.

Location. At highway bridge known as Piedmont toll bridge, 1,000 feet upstream from Southern Railway bridge, 4 miles east of Spencer, 5 miles downstream from mouth of South Yadkin River, 6 miles east of Salisbury, Rowan County, and 26 miles upstream from American Aluminum Co's. hydro-electric plant near Whitney, N. C.

Drainage Area. 3,400 square miles.

RECORDS AVAILABLE. September 24, 1895 to December 31, 1909; September 1,

1911 to December 31, 1923.

GAGE. Chain gage attached to highway bridge; read by J. T. Yarbrough. From the date of establishment to May 31, 1899, the gage was at the Southern Railway bridge, and from the latter date it was at the highway bridge until moved back to the railroad bridge early in 1903, where it remained until the end of 1905. Since January 1, 1906, the gage has been at the highway bridge at the datum originally established there in 1899. The last gage at the railroad bridge read the same as the gage at the highway bridge at gage height 3.2 feet, but not for higher and lower stages. Datum of the original gage at the railroad bridge somewhat uncertain.

DISCHARGE MEASUREMENTS. Made from highway bridge. During the time that gage was at railroad bridge most of the measurements were made from that bridge. During flood of July, 1916, water rose over floor of highway bridge,

making it necessary to use railroad bridge.

CHANNEL AND CONTROL. Channel wide; bed rather rough. Control is a rock ledge

about 500 feet below bridge extending entirely across river.

Extremes of Discharge. 1895-1909; 1911-1923: Maximum stage recorded, 23.8 feet at 1 a.m. July 18, 1916 (discharge, 121,000 second-feet); minimum stage, 1.2 feet September 20, October 5, November 22 and 26, 1897 (discharge 900 second-feet).

ICE. Never enough to affect stage-discharge relation.

REGULATION. Flow during low stages may be slightly affected by developed powers

on the river and tributaries above.

Accuracy. Stage-discharge relation fairly permanent. Rating curves well defined below 20,000 second-feet and fairly well defined between 20,000 and 121,000 second-feet. Gage read to half-tenths twice daily; during high water read oftener. Daily discharge ascertained by applying mean daily gage height to rating table. Records good, except for very high water which are fair.

Note. Mean weekly discharge and monthly values for the break in the record, January 1, 1910 to August 31, 1911, have been estimated from comparative hydrographs with Yadkin River near Peedee, N. C.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET

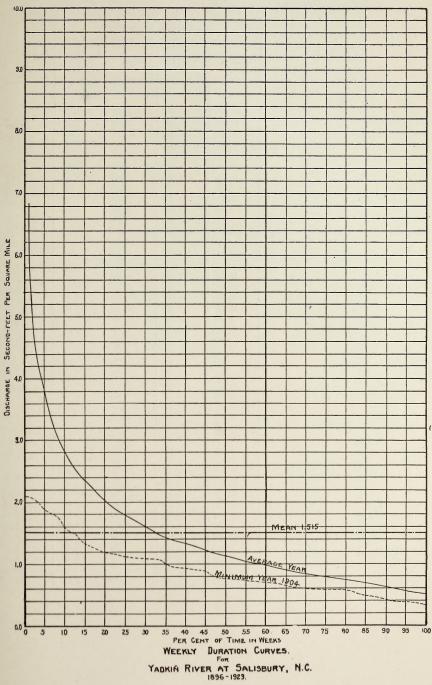
							Ye	ar					= -	
Week	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908
1		4,069	2,967	2,261	10,109	1,621	4,110	10,697	16,843	1,956	2,951	13,727	9,659	7,734
2		5,429	2,320		11,207	5,482	9,554	5,611	6,113	2,278	7,919	5,694	4,157	17,096
3		2,757	4,529	3,114	7,886	6,434	5,127	4,900	4,710	2,061	3,815	5,229	3,664	5,730
4		6,174	6,239	6,184	5,150	4,963	3,331	6,529	6,419	2,717				
		8,060	6,656	2,961	5,636	1,863	3,361	10,589		2,119				
6		14,740			25,843	4,385	4,453	6,154		4,015		4,424		4,636
7 8		5,769	7,464	1,536 2,348	8,400	14,489 8,929	$\begin{bmatrix} 3,460 \\ 2,875 \end{bmatrix}$	4,809 8,062	19,028 8,588	2,606	6,171 $15,276$	3,563		24,083 8,014
9		3,765	7,066		9,300 16,907	14,421		19,638		3,718		3,523		6,111
10			15,212		15,097	7,136	2,757	7,647	9,835	6,190	3,555	4,976		5,966
11		3,243	14,257		25,071	8,811	4,282	8,294	10,004	3,222	3,896	6,531		5,354
12		3,779	8,926		43,243	7,418	2,825		29,014	3,799	2,779	8,021		
13		3,923	5,809		14,036	5,694		10,710	15,446	3,757	2,734	6,779		6,404
14		12,220	13,402	4,025		3,404	18,141	6,610	11,838	2,433	4,036	5,417		6,563
15		3,340	8,222	2,168	10.807	3,160	5,909	6,224	19,952	2,517	6,291	4,223	4,599	4,290
16		3,049	5,809	1,754	7,586		24,401	5,876	9,479	2,131	3,988	4,920		5,940
17		2,806	4,353	3,018	8,043	9,047	8,730	5,060	7,371	2,379	2,720	3,230		4,809
-18		3,486	7,367	2,275	6,050	3,636	5,296	4,717	6,151	2,378	3,238	4,291	4,450	5,374
19		2,660 1,883	4,551	2,804	8,500	3,107		4,420	5,350		10,055	4,210		5,673
21		2,321	6,965 5,005	2,189 4,842	6,579	2,929	5,069	4,906 4,557	5,007 4,413	6,144 3,033	8,414	2,843		4,214
22		1,837	4,451	1,914	4,950 4,321	4,091 2,911	17,663 10,095	3,736	6,320	5,136	3,105 3,373	2,576 3,019	6,944	4,806 3,440
23		5,040	9,329	1,629	4,171	3,434	6,307	3,240	13,777	3,895	2,096	3,653		6,611
24		2,271	6,865	1,934	7,543		13,627	13,291	6,034	4,155	1,861	10,900		4,941
25		2,126	3,657	2,120	3,443		14,856	9,828	4,619	3,345	2,826	6,526		4,290
26		3,729	2,694	1,725	4,050	7,994	11,159	5,764	5,724	6,475	2,144	5,010		3,159
27		6,423	3,219	1,782	3,843	3,499	7,598	3,264	4,693	3,246	6,004	4,453		9,616
28		35,357	5,712	2,093	2,721	3,089	9,923	3,616	4,584	2,452	15,106	5,093	3,553	5,289
29		4,943	5,768	2,338	2,614		12,242	2,507	3,660	1,986	7,583	8,753		3,406
30		3,486	5,257	5,982	4,964	4,174	4,646	2,507	2,329	4,427	4,045	12,441	2,623	4,749
31		2,514	2,749	4,125	4,171	2,768	4,036	3,013	6,000	5,228	3,609	9,729	2,837	3,341
33		2,127	2,850	4,422	2,493		18,589	2,270	3,693	7,112	9,692	4,081	3,324	4,227
34		3,631 $2,227$	3,031 $2,958$	6,074 6,044	2,200 1,593		26,467 $14,143$	5,334 2,489	6,997 3,633	4,690 3,660	10,339 $4,879$	13,026 7,184	3,284	2,519 $15,751$
35		1,224	3,209	4,711	2,550		14, 165	1,789	2,879	2,616		25,774		16,969
36		3,839	2,397	5,820	2,364	1,939	6,627	2,287	3,554	4,003	3,141	7,933	2,297	8,734
37		1,790	1,533	1,536	2,186	2,725	5,323	4,201	3,214	1,989	2,276	5,777	2,707	3,680
38		1,547	1,191	3,066	3,693	4,188	6,861	1,826	8,679	1,624	2,214	5,161	1,904	2,700
39		5,770	1,456	24,353	1,693	2,110	7,004	3,463	2,166	1,501	1,888	5,357	8,094	3,181
40	1,400	7,806	1,304	6,394	1,714	2,559	7,477	4,283	2,126	1,282	1,822	7,710	2,744	2,550
41	1,443	1,689	6,317	2,757	3,507	2,756	5,127	4,423	3,663	1,311	3,068	5,100	2,296	7,426
42	1,457	1,693	4,090	2,271	2,036	2,348	4,570	2,784	2,584	1,190	2,046	11,811	2,064	3,096
44	1,400	1,789	3,195	7,208	1,829	7,568	3,871	2,366	2,129	1,265	1,994	7,343	1,964	9,286
45	1,746	3,139	2,995	2,493	2,543	3,244	3,769	3,144	1,869	1,384	1,967	4,704	2,470	9,253
46	1,841 2,174	10,049 3,146	2,756 1,769	1,904 2,300	2,243 1,800	3,173 2,714	3,614 3,460	3,159 3,097	3,043 2,411	1,996 2,594	1,848	4,216	2,461	3,986 6,509
47	1,640	2,660	1,283	2,300	1,800	2,839	3,903	5,351	2,411	1,722	1,784 1,835	4,193 12,389	2,514 8,957	3,900
48	2,369	9,560	4,627	1,907	2,114	9,175	3,614	6,689	1,993	1,591	1,770	4,826	4,759	3,520
49	1,786	5,380	3,877	6,616	1,979	8,677	3,976	11,097	1,961	3,697	3,836	4,193	2,779	5,327
50	1,786	5,426	2,821	1,725	4,350	3,527	9,461	4,584	2,040	2,047	6,545	4,789	10,951	4,993
51	2,369	7,469	2,934	2,702	2,093	4,121	6,341	7,677	2,600	1,914	11,289	5,647	6,990	8,061
52	4,702	3,298	2,800	2,525	2,594	4,644	30,292	4,841	2,498	3,099	6,667	4,370	12,930	8,641

OF YADKIN RIVER NEAR SALISBURY, N. C.

			NEAR L	TEISE (,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	. 0.	Year								1
							rear								Week
1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	M
															-
7,143	2,386	9,286	4,670	2.976	10,241	10.094	5,963	4,701	1.974	18,014	2,170	4,349	2,101	5,566	1
5,247	2,814		3,043	2,537		19,097	4,830	3,640	6,541	5,271	2,794	9,389	3,467	3,239	1
7,296		2,700	2,789	2,326		11,420	3,730	4,533	5,513	5,720	2,517	11,980	2,644	2,371	3
4,607		2,643	2,669	7,701	2,996	6,264		4,051	4,424	9,286	5,779	5,891	4,484	3,470	
3,944 4,971		2,400 4,600	4,740 2,540	6,159 3,136	6,203	10,639 6,490	20,443 6,689	7,314 3,484	11,160 4,499	5,480 4,474	8,059 7,291	8,283 13,597	7,029 7,897	5,301 5,526	
5,141		4,929	4,443	2,921	4,273	5,466	4,380	3,133	3,796	6,291		10,374	10,026	4,287	
6,823	.8,714	3,114	8,497	3,084	9,713	7,901	5,314	7,557	3,379	7,763	3,937	8,849	4,377	3,230	
6,549	11,000		8,012	6,356	4,707	7,319		10,711		12,346	4,118	5,406	7,993	5,271	9
5,659 5,204		3,729 $5,229$	7,391 34,260	3,466	3,773 6,431	6,940 4,770	3,686	16,290 $6,653$	2,764	18,334 7,046	6,206 8,331	4,646 4,554	8,809	6,790 22,643	
4,951		4,229	7,086	6,557	3,941	4,289		10,721	3,681	5,606	6,874	4,749	5,931	12,734	
9,645		3,943	11,254	9,474	3,779	3,983	3,541	7,671	2,774	5,680	7,466	4,654	7, 523	4,473	
4,677		5,057	7,491	4,153	4,081	4,337	4,453	9,601	2,293		21,223	5,251	6,280	5,567	
7,368		9,314		10,084	6,374	4,173	4,877	5,947	5,336	6,909	8,297	4,051	4,303	7,237	
5,641 4,794		6,357 3,429	5,296 6,724	5,544 3,773	7,940 4,011	3,499 3,296	3,253 3,090	3,860 3,876	9,374 5,544	5,489 4,523	5,320 $5,369$	10,440 7,654	5,263 4,351	4,769 3,534	
10,351		2,771	4,124	3,134	3,557	3,273	2,777	4,009	3,983	8,754	3,914	6,671	9,143	3,920	
5,413		2,357	15,209	3,093	3,601	5,044	2,470	3,690	3,137	8,971	3,943	6,166		3,286	
.3,837		2,743	12,517	3,217	2,744	3,137	2,636	3,070	3,811	7,374	3,243		11,577	5,423	
22,377		1,886		10,393	2,324	3,957	9,189	3,059	3,930	8,106	3,509	4,697		4,570 4,907	
6,397 20,968		$\begin{vmatrix} 1,529 \\ 2,300 \end{vmatrix}$	3,541 3,610	7,184 3,774	2,397 2,181	12,713	3,630 10,201	2,616 2,941	2,473 2,174	5,923 4,294	2,729 6,237	3,891	6,099 11,514	2,770	
11,181		1,814	3,716	3,084	2,091	3,499	6,820	4,206	1,857	4,144	2,847	3,351	4,774	2,749	
12,097	15,029	2,029	3,183	2,723	1,806	3,046		2,520	2,960	3,991	5,051	2,886	5,539	2,136	
6,997		1,750	3,724	3,443	1,854	2,140		2,706	2,073	8,111	3,133	3,764	3,551	2,629	
5,296 4,430		1,357 1,507	5,583	3,530 $2,077$	2,719 2,706	3,159		3,119 3,597	1,833 1,830	3,514 3,201	2,644 3,854	2,519 3,214	6,213 $4,217$	2,533 2,111	
3,378		2,364	4,316 4,587	2,580	3,074		11,624 $54,386$	7,086		30,860	5,309	4,883	9,394	2,601	
6,276		1,357	2,944	2,011	1,437		16,471	7,859		11,591	2,836	2,514	4,573	2,214	
13,527		1,221	2,386	4,757	1,479		19,583	4,476	4,676		2,009	2,491	3,433	3,979	
5,236		2,579	2,291	4,436	1,709	2,153		2,636	2,224	3,263	5,210	2,184	3,284	5,130 3,241	
4,820 3,093		1,621 1,571	2,057 1,859	2,923 6,450	2,210 1,420	4,476 6,836		2,299 1,884	4,971 3,349	5,834 3,181	6,351 5,574	2,470 1,931	5,914 2,796		
2,773		3,876	2,206		3,367	14,014		11,890	2,706		11,491	1,734	2,831	2,817	
2,589	7,586	2,590	1,817	6,860	1,781	9,480			2,446	2,537	3,260	1,701	3,349		
2,683		1,872	3,159	2,387	1,681	3,320		2,434	2,153		3,594	2,130	2,263		
3,870 2,946		3,043 $2,317$	2,254 9,867	4,634 $2,723$	1,566 1,581	2,329 2,073		1,870 1,976	$\begin{vmatrix} 3,110 \\ 2,261 \end{vmatrix}$	2,206 2,191	3,966 6,200	2,284 2,349	1,851 1,771	2,411 2,607	
2,940 $2,403$		1,489	2,346		4,279	13,409		1,843	1,617	2,191	5,050		2,091	1,653	
2,999		1,873		2,257	2,434	5,027			1,503		2,484	1,594	5,380		
2,916		8,330		4,814	9,384	3,947	6,183		1,597	3,061	2,310		2,326		
2,800		6,579		5,876		3,554					2,293		2,230		
2,513 $2,596$		$\begin{bmatrix} 2,054 \\ 3,704 \end{bmatrix}$		2,791 5,881	2,073 1,871	2,706			12,809		2,380		2,043 1,986		
2,740		3,604		3,059							6,153				
2,530	2,000	3,148	2,273	2,464			2,780	2,017	4,214	2,664	3,634	2,579	1,986	1,934	
2,403		2,876			5,559										
2,720 4,904		2,193			21,773										
3,036		$\begin{vmatrix} 2,251 \\ 7,053 \end{vmatrix}$			6,613										
2,837		9,426			14,298				12,510		6,820	1			
						100									1

MONTHLY DISCHARGE OF YADKIN RIVER NEAR SALISBURY, N. C. [Drainage area, 3,400 square miles]

	1	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1895					
October	1,500	1,400	1,426	0.42	0.48
November	4,020	1,310	2,004	.59	.69
December	10,160	1,640	2,683	.79	.91
1896					
January	10,940	1,640	4,485	1.32	1.52
February	24,200	2,320	7,817	2.30	2.48
March	5,380	2,320	3,472	1.02	1.18
April	29,200	2,660	5,242	1.54	1.72
May	6,060	1,310	2,507	.74	.85
June	9,460	1,310	3,159	.93	1.03
July	64,200	1,640	11,584	3.41	3.94
August	6,060	1,000	2,411	.71	.82
September	32,200	1,000	3,087	.91	1.01 1.06
	31,200	1,310	3,122	.92	1.06
November	23,200 22,700	1,980 3,000	5,206 6,037	1.48 1.78	2.05
December	22,700	3,000	0,007	1.76	2.03
The year	64,200	1,000	4,844	1.42	19.31
1897					
January	12,044	2,600	4,039	1.19	1.37
February	34,924	4,652	11,513	3.39	3.45
MarchApril	25,068 31,756	4,652	10,522 7,761	3.10 2.28	3.58 2.54
May	14,156	3,948 3,250	5,776	1.70	1.96
June	19,788	2,300	5,652	1.66	1.85
July	11,692	2,600	4,821	1.42	1.64
August	5,708	1,760	2,943	.87	1.00
September	3,250	1,100	1,785	.53	.59
October	25,772	900	3,557	1.05	1:21
November	7,116	900	2,708	.80	.89
December	5,708	2,300	3,086	.91	1.05
The year	34,924	900	5,347	1.57	20.87
January	9,290	2,100	3,460	1.02	1.18
February	2,850	1,400	1,957	.58	.60
March	13,820	1,725	3,119	.92	1.06
April	10,645	1,550	2,977	.88	.98
May	12,058	1,550	2,928	.86	.99
June	2,567	1,400	1,855	.55	.61
July	10,450	1,100	3,178	.94	1.08
August	12,880	1,725	5,185	1.53	1.76
September	79.998	1,400	8,297	2.44	2.72
October	16,550	1,725	4,411	1.30	1.50
November	4,800	1,725	2,211	.65	.72
December	12,645	1,550	3.257	.96	1.10
The year	79,998	1,100	3,570	1.05	14.30



Monthly Discharge of Yadkin River Near Salisbury, N. C.—Continued

]	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1899					
	46,600	2,560	8,548	2.51	2.90
January February	45,800	3,100	13,443	3.95	4.11
March	107,400	6,900	23,899	7.03	8.10
April	27,700	6,500	9,825	2.89	3.22
May	11,300	4,000	6,211	1.83	2.11
June	12,900	3,100	4,823	1.42	1.58
July	10,900	2,250	3,703	1.09	1.26
August	5,000	1,450	2,356	.69	.79
September	10,500	1,450	2,495	.73	.81
October	5,700	1,600	2,226	.65	.75
November	3,700	1,800	2,120	.62	.69
December	8,900	1,800	2,716	.80	.92
The year	107,400	1,450	6,864	2.02	27.24
1900					
January	15,250	1,430	4,405	1.25	1.44
February	37,800	1,430	7,029	2.07	2.13
March	40,500	4,080	9,182	2.70	3.12
April	48,298	2,250	8,679	2.55	2.84
May	8,450	2,500	3,331	.98	1.13
June	24,060	3,000	6,190	1.82	2.03
July	5,945	2,060	3,332	.98	1.13
August	5,112	1,870	2,415	.71	.82
September	12,570	1,625	2,769	.81	1.2
October November	22,830	2,060	3,750	1.10	1.45
December	29,435 21,915	2,625 3,125	4,417 5,138	1.30 1.51	1.74
The year	48,298	1,430	5,053	1.48	20.02
1901				====	
January	26,731	2,925	5,284	1.55	1.79
February	6,195	2,420	3,507	1.03	1.07
March	35,310	2,585	5,922	1.74	2.01
April	81,030	4,180	13,787	4.06	4.53
May	70,870	4,000	11,152	3.28	3.78
June	30,400	4,540	10,950	3.22	3.59
July	26,026	3,820	8,455	2.49	2.87
August	44,132	3,640	16,509	4.86	5.60
September	15,910	4,360	6,764	1.99	2.22
October	13,420	3,640	5,116	1.51	1.74
November December	6,380	3,100	3,683	1.08 3.68	1.20 4.24
Detember	104,640	3,280	12,506	3.08	4.24
The year	104,640	2,420	8,636	2.54	34.64

Monthly Discharge of Yadkin River Near Salisbury, N. C.—Continued

	Discharges in Second-feet				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1902					
January	25,190	4,740	5,678	1.67	1.93
February	27, 295	4,580	8,763	2.58	2.69
March	32,740	5,390	9,759	2.87	3.31
April	9,480	4,900	6,031	1.77	1.97
May	5,900	3,470	4,530	1.33	1.53
June	55,700	2,570	7,700	2.27	2.53
July	5,220	1,980	2,974	.88	1.01
August	9,670	1,465	3,108	.91	1.05
September	10,620	1,580	2,871	.84	.94
October	10,810	1,350	3,512	1.03	1.19
November	12,200	2,120	3,833	1.13	1.26
December	16,750	3,940	7,273	2.14	2.47
The year	55,700	1,350	5,503	1.62	21.88
1903	00.000	0 770	0.401	0.40	0.00
January	38,070	3,750	8,421	2.48	2.86
February	38,650	5,030	12,677	3.73	3.88
March	76,200	6,475	15,798	4.65	5.36
April	39,565	6,475	12,174	3.58	3.99
May	10,370	4,230	5,393	1.59	1.83
June	32,480	3,910	7,446	2.19	2.44
July	7,960	1,865	3,872	1.14	1.31
August	12,600	1,865	4,744	1.40	
September	21,100	1,865	4,343	1.28	1.43
October	8,300	1,620	2,536	.75	.84
November	5,350	1,740	2,542	.75	
December	4,390	1,500	2,260	.66	.76
The year	76,200	1,500	6,850	2.01	27.17
January	4,110	1,300	2,226	0.655	0.76
February	13,020	2,026	4, 151	1.22	1.32
March	13,440	2,445	4,177	1.23	1.34
April	3.405	1,950	2,370	.697	.78
May	19,320	1,950	3,521	1.04	1.20
June	18,270	1,860	4,770	1.40	1.56
July	12,810	1,685	3,624	1.07	1.23
August	11,987	1,860	4,434	1.30	1.50
September	5,768	1,372	2,376	. 699	.78
October	1,372	1,050	1,268	.373	.43
November	2,775	1,372	1,931	.568	.63
December	5,455	1,523	2,630	.774	.89
The year	19,320	1,050	3,123	0.92	12.42

MONTHLY DISCHARGE OF YADKIN RIVER NEAR SALISBURY, N. C.—Continued

	1				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1905					
January	16,000	1,235	4,007	1.18	1.36
February	27,520	1,950	7, 107	2.09	2.18
March	5,300	2,445	3,447	1.01	1.16
April	12,750	2,140	4,153	1.22	1.36
May	14,320	2,240	5,977	1.76	2.03
June	4,110	1,685	2,332	.686	.76
July	33,820	1,770	7,835	2.31	2.66
August	22,890	2,340	6,678	1.97	2.27
September	4,995	1,770	2,381	.700	.78
October	7,190	1,600	2,221	.653	.75
November	2,045	1,685	1,818	.535	.60
December	31,460	1,770	6,513	1.92	2.21
The year	33,820	1,235	4,539	1.34	18.12
1906					
January	34,600	2,990	10,300	3.03	3.49
February	6,760	3,130	4,190	1.23	1.28
March	14,600	3,270	6,020	1.77	2.04
April	11,600	2,590	4,630	1.36	1.52
May	6,760	2,340	3,460	1.02	1.18
June	16,400	2,340	6,230	1.83	2.04
July	21,500	2,720	7,540	2.22	2.56
August	51,400	3,420	10,900	3.21	3.70
September	38,800	4,170	7,630	2.24	2.50
October	36,400	4,010	7,700	2.26	2.61
November	31,000	4,010	6,140	1.81	2.02
December.	6,580	3,270	4,720	1.39	1.60
The year	38,800	2,340	6,620	1.95	26.54
January	22,700	3,070	5,020	1.48	1.71
February	6,460	3,070	3,640	1.07	1.11
March	7,590	2,930	4,600	1.35	1.56
April	13,000	3,210	5., 230	1.54	1.72
May	4,720	2,400	3,280	.965	1.11
June	21,200	2,930	6,750	1.99	2.22
July	7,980	2,400	3,750	1.10	1.27
August		1,910	2,960	.871	1.00
September	26,900	1,570	3,610	1.06	1.18
October	3,500	1,680	2,260	.665	.77
November	21,700	2,150	4,510	1.33	1.48
December	38,000	2,530	8,210	2.41	2.78
The year	38,000	1,570	4,485	1.32	17.91

Monthly Discharge of Yadkin River Near Salisbury, N. C.—Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1908					2
January	33,400	3,500	8,640	2.54	2.93
February	48,200	3,500	10,500	3.09	3.33
March	22,200	4,720	6,840	2.01	2.32
April	10,400	4,090	5,360	1.58	1.76
May	9,170	3,360	4,860	1.43	1.65
June	17,700	2,660	4,660	1.37	1.53
July	14,900	2,660	5,580	1.64	1.89
August	67,800	2,150	9,120	2.68	3.09
September	15,300	2,400	4,540	1.34	1.50
October	22,200	2,400	6,370	1.87	2.16
November	12,200	3,500	4,730	1.39	1.55
December	28,600	3,210	6,600	1.94	2.24
The year	67,800	2,150	6,483	1.91	25.95
1909 January	12,600	4,090	5,890	1.73	1.99
February	13,000	3,500	5,630	1.66	1.73
March	17,700	4,090	6,280	1.85	2.13
April	16,300	4,090	5,600	1.65	1.84
May	54,400	3,500	10,200	3.00	3.46
June	44,700	5,050	12,200	3.59	4.00
July	12,200	2,930	5,130	1.51	1.74
August	28,000	2,660	6,030	1.77	2.04
September	5,740	2,150	3,000	.882	.98
Oet ober	5,220	2,150	2,750	.809	. 93
November	3,500	2,280	2,580	.759	.85
December	8,770	1,570	3,200	.941	1.08
The year	54,400	1,570	5,708	1.68	22.77
January	14,000	1,900	4,177	1.23	1.42
February	15,000	3,200	6,096	1.79	-1.86
March	25,000	2,700	5,681	1.67	1.92
April	6,000	2,300	3,027	.890	.99
May	10,500	2,100	3,281	.965	1.11
June	40,000	1,700	6,460	1.90	2.12
July	11,000	1,900	3,623	1.07	1.23
August	7,000	1,700	2,913	.857	.99
September	15,000	1,600	3,800	1.12	1.25
Oetober	15,000	1,800	3,290	.968	1.12
November	2,200	1,700	1,973	.580	.65
December	7,000	1,900	2,748	.808	.93
The year	40,000	1,600	3,922	1.15	15.59

Monthly Discharge of Yadkin River Near Salisbury, N. C.—Continued

]	Discharges in	Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
		,			
1911					
January	20,000	2,400	4,384	1.30	1.50
February	11,000	2,300	3,779	1.11	1.16
March	8,000	2,100	4,077	1.20	1.38
April	20,000	2,800	5,860	1.72	1.92
May	3,500	1,550	2,313	.680	.78
June	3,500	1,300	1,922	.565	.63
July	4,600	1,100	1,627	.479	.55
August	11,000	1,000	2,113	.621 .756	.72
September	8,770	1,250	2,570	1.28	1.48
October	24,800	1,250	4,360	.935	
November December	5,740	1,400	3,180 4,900	1.44	1.04 1.66
December	17,200	1,940	4,900	1.44	1.00
The year	24,800	1,000	3,424	1.01	13.66
January	7,590	2,060	3,530	1.04	1.20
February	17,200	2,290	5,840	1.72	1.86
March	103,000	4,090	13,900	4.09	4.72
April	14,400	3,790	6,020	1.77	1.98
May	57, 200	3,500	8,520	2.51	2.89
June	5,050	2,410	3,550	1.04	1.16
July	11,700	2,060	4,190	1.23	1.42
August	3,500	1,530	2,180	.641	.74
September	23,200	1,440	4,100	1.21	1.35
October	3,210	1,730	2,230	.656	.76
November	12,600	1,940	2,950	.868	.97
December	2,930	1,940	2,330	.685	.79
The year	103,000	1,440	4,945	1.45	19.84
January	22,200	2,170	4 200	1.29	1.49
February	12,200	2,170	4,380 3,500	1.29	1.49
March	77,200	2,410	12,000	3.53	4.07
April	23,800	3,500	5,850	1.72	1.92
May	25,900	2,410	5,640	1.66	1.92
June	5,390	2,410	3,330	.979	1.09
July	6,460	1,530	2,600	.765	.88
August	10,400	1,730	4,850	1.43	1.65
September	13,900	1,730	4,110	1.45	1.35
October	12,200	1,630	3,700	1.09	1.26
November	12,600	2,170	3,360	.988	1.10
December	19,200	2,170	4,530	1.33	1.53
The year.	77,200	1,530	4,821	1.42	19.32
in journey	11,200	1,000	+,021	1.42	19.52

MONTHLY DISCHARGE OF YADKIN RIVER NEAR SALISBURY, N. C.—Continued

		Discharges in Second-feet				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1914				7		
January	24,300	2,660	4,820	1.42	1.64	
February	18,200	3,500	6,370	1.42	1.95	
March	9,580	3,360	4,480	1.32	1.52	
April	15,800	3,500	5,490	1.61	1.80	
May	5,050	2,170	2,950	.868	1.00	
June	2,930	1,630	2,050	.603	.67	
July	6,100	1,160	2,400	.706	.81	
August	6,100	1.130	2,070	.609	.70	
September	2,540	1,300	1,680	.494	.55	
October.	26,400	1,250	4,470	1.31	1.51	
November	7,210	1,690	2,510	.738	.82	
December	50,200	3,790	12,000	3.53	4.07-	
December	50,200	5,750	12,000	0.00	4.07	
The year	50,200	1,130	4,274	1.26	17.04	
1915			11.000			
January	54,400	4,240	11,300	3.32	3.83	
February	24,800	4,400	8,170	2.40	2.50	
March	9,580	3,790	5,060	1.49	1.72	
April	5,050	3,070	3,810	1.12	1.25	
May	8,370	2,800	3,960	1.16	1.34	
June	32,800	2,060	5,560	1.64	1.83	
July	4,400	1,630	2,540	.747	.86	
August	32,800	1,690	6,340	1.86	2.14	
September	22,700	1,940	4,520	1.33	1.48	
October	24,600	2,660	6,130	1.80	2.08	
November	18,500	2,410	3,910	1.15	1.28	
December	38,600	2,410	7,270	2.14	2.47	
The year	54,400	1,630	5,714	1.68	22.78	
January	10,000	3,500	5,010	1.47	1.70	
February	54,200	3,790	9,180	2.70	2.91	
March	5,740	3,210	3,950	1.16	1.34	
April	8,000	2,930	3,860	1.14	1.27	
May	29,000	2,060	4,270	1.26	1.45	
June	28,400	2,410	6,120	1.80	2.01	
July	107,000	2,410	20,700	6.09	7.02	
August	11,200	3,500	6,000	1.76	2.13	
September	8,000	2,660	3,500	1.03	1.15	
October	18,500	2,410	3,740	1.10	1.27	
November	3,210	2,540	2,790	.821	.92	
December	5,390	2,290	3,290	.968	1.12	
The year	107,000	2,060	6,034	1.77	24.19	

MONTHLY DISCHARGE OF YADKIN RIVER NEAR SALISBURY, N. C.—Continued

	1				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1917					
January	12,000	2,930	4,640	1.36	1.5
February	10,800	2,930	4,990	1.47	1.5
March	43,400	4,720	11,100	3.26	3.7
April	24,600	3,210	5,700	1.68	1.8
May	4,400	2,660	3,380	.994	1.1
June	5,390	2,060	3,060	.900	1.0
July	11,200	1,940	5,170	1.52	1.7
August	9,200	1.530	2,860	.841	.9.
September	34,400	1,630	5,100	1.50	1.6
October	5,740	1,630	2,200.	.647	.:
November	3,790	1,730	2,110	.621	.0
December	2,800	1,340	2,120	. 624	
The year	43,400	1,340	4,369	1.29	17
1918 January	18,000	1,630	5,740	1.69	1.
February	10,000	2,800	4,270	1 26	1.
March	5,050	2,290	2,910	.856	1.
April	22,000	2,060	5,480	1.61	1.
Mav	6,100	2,410	3,570	1.05	1.
June	4,400	1,530	2,290	.674	
July	5,050	1,530	2,500	.735	
August	14,700	1,730	3,530	1.04	1.
September	5,390	1,630	2,530	.744	
October	34,400	1,360	5,270	1.55	1.
November	19,000	2,610	4,850	1.43	1.
December	42,200	2,740	9,370	2.76	3.
The year.	42,200	1,360	4,359	1.28	17.
1919	45,000	1 000	0.000	0.70	9
January February	45, 200	4,200	9,260 6,630	2.72 1.95	3.
March	17,000	4,200		2.86	3.
A pril	36,200	4,840	9,740	1.60	1.
May	12,000	3,900	5,440	2.42	2.
June		5,160	8,230	1.50	1.
		3,600	5,100		
July	72,200	2,740	11,500	3.38 1.17	3. 1.
August September	12,400 3,900	2,610 1,870	3,990 2,410	.709	1.
October		1,870	2,410	.865	
November		2,300	2,940	.856	
December	16,000	2,300	3,970	1.17	1.
					24.
The year	72,200	1,870	6,010	1.77	24.

MONTHLY DISCHARGE OF YADKIN RIVER NEAR SALISBURY, N. C.-Continued

]				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1920					
January	10,400	1,420	3,730	1.10	1.27
February	20,500	3,110	5,470	1.61	1.74
March	14,700	3,110	6,720	1.98	2.28
April	37,400	4,020	9,780	2.88	3.21
May	5,600	2,480	3,520	1.04	1.20
June	12,900	2,480	4,190	1.23	1.37
July	7,360	1,920	3,520	1.04	1.20
August	25,200	1,820	6,490	1.91	2.20
September	10,000	2,480	4,040	1.19	1.33
October	12,400	2,130	2,980	.876	1.01
November	21,500	2,240	4,660	1.37	1.53
December	32,000	4,600	9,550	2.81	3.24
The year	37,400	1,420	5,388	1.58	21.58
1921 January	27,400	3,800	7,820	2.30	2.65
February	42,800	5,600	10,100	2.97	3.09
March	5,600	4,280	4,680	1.38	1.59
April.	23,500	3,800	6,820	2.01	2.24
May	10,800	3,640	5,720	1.68	1.94
June	5,260	2,480	3,530	1.04	1.16
July	6,640	2,100	3,280	.965	1.11
August	3,400	1,640	2,150	.632	.78
September	4,230	1,400	2,090	.615	.69
October	8,240	1,400	1,850	.544	.68
November	24,400	2,210	3,920	1.15	1.28
December	4,740	2,000	2,560	.753	.87
The year	42,800	1,400	4,543	1.34	17.98
1922 January	8,240	2,000	3,200	0.941	1.08
February	23,900	3,250	7,370	2.17	2.26
March	18,800	3,890	8,390	2.47	2.85
April	10,200	3,560	5,240	1.54	1.72
May	25,000	3,560	7,900	2.32	2.68
June	17,800	3,100	6,580	1.94	2.16
July	16,800	3,250	5,280	1.55	1.99
August	14,500	2,320	3,710	1.09	1.26
September	5,760	1,720	2,330	.685	.76
October	11,800	1,640	2,920	.859	.99
November	2,100	1,900	2,000	.588	. 66
December	6,100	2,000	2,700	.794	.92
The year	25,000	1,640	4,802	1.41	19.33

DISCHARGE RECORDS OF

MONTHLY DISCHARGE OF YADKIN RIVER NEAR SALISBURY, N. C.—Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1923					
January	11,800	2,320	3,890	1.14	1.31
February	8,620	2,560	4,480	1.32	1.38
March	66,000	3,100	11,000	3.24	3.74
April	17,800	3,100	5,260	1.55	1.73
May	10,200	2,820	4,420	1.30	1.50
June	4,400	1,900	2,710	.797	.89
July	5,420	1,560	2,460	.724	.83
August	10,600	1,900	3,510	1.03	1.19
September	7,140	1,560	2,750	.809	.90
October	2,560	1,260	1,700	.50	.58
November	10,200	1,640	2,520	.741	.83
December	20,800	2,320	4,010	1.18	1.36
The year	66,000	1,260	3,984	1.18	16.24

YADKIN RIVER AT HIGH ROCK, N. C.

LOCATION. About 50 feet upstream from Brinkles Ferry at High Rock, Davidson County, about 14 miles downstream from Salisbury gaging station and about 15 miles upstream from big dam of Tallassee Power Co., at Badin.

Drainage Area. 3,930 square miles.

RECORDS AVAILABLE. January 8, 1919 to December 31, 1923.

GAGE. Friez 7-day graph water-stage recorder in concrete well and shelter on right bank about 40 feet from edge of river; attended by employees of Tallassee Power Co. Zero flow at gage about elevation 592.8 feet above sea level.

CHANNEL AND CONTROL. Bed of stream composed of rock and gravel; fairly smooth and straight. Banks about 20 feet high; probably not subject to over-

flow. Control is rock shoal about half a mile downstream; permanent.

EXTREMES OF DISCHARGE. 1919-1923: Maximum stage, elevation 605.9 feet, morning of July 21, 1921 (discharge, 104,000 second-feet); minimum mean daily stage, elevation 593.68 feet October 17.19, 1923 (discharge, 1,170 second-feet); 1916 flood elevation, 612.1 feet, (discharge, 184,000 second-feet).

ICE. Stage-discharge relation not affected by ice.

REGULATION. Slight diurnal regulation noticeable in low water periods, from

power developments on tributaries.

Accuracy. Stage-discharge relation permanent. Rating curve well defined between 1,000 and 28,000 second-feet and extended above. Operation of waterstage recorder not satisfactory. Daily discharge ascertained by applying to the rating table mean daily gage height obtained by inspecting gage height graphs. Records fair.

Cooperation. Water-stage recorder graphs and list of discharge measurements

furnished by Tallassee Power Co.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF YADKIN RIVER AT HIGH ROCK, N. C.

_	Year								
Week	1919	1920	1921	1922	1923				
1		2,607	5,233	2,461	6,2				
2	6,070	3,269	11,049	4,549	4,1				
3	6,391	3,543	14,066	3,671	2,6				
	12,129	6,349	6,441	5,670	3,9				
	9,676	9,726	9,523	7,997	7,1				
	8,150	9,876	17,249	10,270	7,1				
	8,247	4,719	13,013	12,599	5,8				
	8,287	3,997	10,004	4,991	3,4				
	12,437	4,330	6,376	9,089	6,1				
	14,493	7,134	5,276	11,041	9,				
	7,926	9,509	5,227	12,033					
					21,2				
	6,187	7,797	5,457	7,540	15,				
	5,186	8,380	5,536	8,019	5,0				
	4,483	24,143	5,974	7,494	6,8				
	6,647	9,571	4,529	5,559	8,0				
	6,349	5,986	11,139	5,906	6,				
	5,059	5,834	8,370	6,297	4,8				
	6,324	4,217	7,476	10,141	5,5				
	7,459	4,357	6,694	8,249	4,0				
	7,284	3,286	7,393	13,663	7,0				
	6,430	3,864	5,336	9,624	5,6				
	6,599	3,243	4,589	6,766	5,2				
	5,276	7,499	4,700	13,734	2,9				
	4,847	3,866	3,911	6,046	3,0				
	4,347	6,867	3,476	5,990	2,2				
	4,901	3,310	4,241	3,951	2,8				
	3,520	2,390	2,953	7,347	2,5				
	3,243	3,416	3,763	5,046	2,8				
	30,484		5,534	9,779	2,9				
	13,531	5,601	3,224		1,8				
		3,194		5,349					
	5,169	2,297	2,771	4,464	3,9				
	3,583	5,700	2,560	3,931	5,8				
	6,003	8,039	3,040	4,426	3,5				
	3,584	6,714	2,237	3,903	3,2				
	3,424	10,757	1,886	3,359	3,0				
	2,813	4,023	1,923	3,490	3,9				
	2,597	4,129	2,369	2,621	4,2				
	2,383	3,576	2,123	2,290	2,0				
	2,443	6,780	2,554	2,290	3,9				
	2,500	5,776	1,843	1,883	1,8				
	3,034	2,910	1,539	6, 189	1,2				
	3,934	2,711	1,413	2,950	1,2				
	4,461	2,671	1,499	2,443	1,6				
	3,160	2,831	8,086	2,197	1,7				
	2,790	2,691	3,527	2,179	5,1				
	4,890	6,610	2,871	2,141	2,4				
	3,263	4,423	3,701	2,290	2,3				
	3,077	12,330	3,423	2,383	2,9				
	3,076	10,410	4,143	2,537	7,9				
	8,630	15,517	2,713	2,891	3,6				
	3,766								
		6,584	3,006	4,619	3,2				
	3,181	8,244	3,163	3,395	3,7				

Monthly Discharge of Yadkin River at High Rock, N. C. [Drainage area, 3,930 square miles]

	1				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1919					
January 8-31	21,500	4,800	8,540	2.17	1.94
February	14,000	5,130	8,720	2.22	2.31
March.	21,000	4,800	9,110	2.32	2,68
April	13,900	4,170	5.570	1.42	1.58
May	8,630	4,800	6,950	1.77	2.04
June	6,590	4,170	4,990	1.27	1.42
July	86,000	3,120	12,000	3.05	3.52
August	9,050	2,690	4,300	1.09	1.26
September	4.170	2,290	2,670	.679	.76
October	5,470	2,290	3,470	.883	1.02
November	9,470	2,690	3,470	.883	.99
December	22,000	2,950	4,510	1.15	1.33
1920	22,000	2,000			
January	13,000	2,030	4,500	1.15	1.33
February.	31,600	3,560	6,480	1.65	1.78
March.	17,000	3,710	7,650	1.95	2.25
April	42,000	4,170	11,100	2.82	3.15
May	6,210	2,970	3,820	.972	1.12
June	14,000	2,690	5,250	1.34	1.50
July	8,210	1,900	3,530	.898	1.04
August	19,800	2,160	6,980	1.78	2.05
September	11,200	2,970	4,770	1.21	1.35
October	12,600	2,560	3,460	.880	1.01
November	20,400	2,560	5,180	1.32	1.47
December	30,000	5,130	10,700	2.72	3.14
The year	42,000	1.900	6,120	1.56	21.19
January	31,000	4,480	9,090	2.31	2.66
February	52,500	6,210	12,300	3.13	3.26
March	6,990	4,800	5,440	1.38	1.59
April	27,600	4,170	7.480	1.90	2.12
May	12,100	4.480	6,450	1.64	1.89
June	5,470	3,120	4.060	1.03	1.15
July	7.790	2.560	3,830	.975	1.12
August	4,020	1.780	2,520	.641	.74
September	5, 130	1,390	2,320	.565	.63
October	5, 130	1,300	1.680	.427	.49
November	20,400	2,690	4,530	1.15	1.28
December	5,130	2,290	3,280	835	.96
The year	52,500	1.300	5,240	1.33	17.89

MONTHLY DISCHARGE OF YADKIN RIVER AT HIGH ROCK, N. C .- Continued

		Discharges in Second-feet				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1922						
January	9,050	2,290	4,120	1.05	1.21	
February	23,800	4,170	9,000	2.29	2.38	
March	19,800	5,130	9,990	2.54	2.93	
April	10,800	4,170	6,480	1.65	1.84	
May	28,400	4,800	9,860	2.51	2.89	
June	19,300	3,560	7,660	1.95	2.18	
July	16,600	3,860	6,670	1.70	1.96	
August	5,830	2,830	4,040	1.03	1.19	
September	5,830	2,160	2,680	.682	.76	
October	8,630	1,780	3,260	.830	.96	
November	2,420	2,030	2,230	.567	.63	
December	5,830	2,290	3,300	.840	.97	
The year	28,400	1,780	5,770	1.47	19.90	
January	8,630	2,560	4,590	1,17	1.35	
February	9,890	2,970	5,680	1.45	1.51	
March	65,200	4,020	12,300	3.13	3.61	
April	18,200	3,860	6,570	1.67	1.86	
May	11,700	3,560	5,380	1.37	1.58	
June	6,210	2,030	3,020	.768	.86	
July	6,990	1,430	2,610	.664	.77	
August	9,470	2,030	3,880	.987	1.14	
September	9,470	1,660	3,460	.880	.98	
October.	1,900	1,170	1,410	.359	.41	
November	10,800	- 1,540	2,980	.758	.85	
December	19,300	2,970	4,610	1.17	1.35	
The year	65,200	1,170	4,710	1.20	16.27	

YADKIN RIVER AT NORWOOD, N. C.

- LOCATION. At Blalocks Ferry 1 mile above Richland Creek and about 2 miles from Norwood, Stanly County.
- Drainage Area. 4,614 square miles.
- RECORDS AVAILABLE. September 1, 1896 to December 31, 1899, when station was discontinued.
- Gage. Vertical rod fastened to tree near ferry; read by W. B. Nichols.
- DISCHARGE MEASUREMENTS. Made from ferryboat.
- CHANNEL AND CONTROL. Bed of stream, sand and gravel; shifting. Current swift; channel straight and free from all obstructions. Control not known. Both banks low and during extreme stages are overflowed for a distance of half
- EXTREMES OF DISCHARGE. Maximum stage recorded, 11.0 feet September 25, 1898 (discharge not determined); minimum stage recorded, 0.8 foot September 17, 1897 (discharge, 1,310 second-feet). ICE. Stage-discharge relation not affected by ice.
- REGULATION. Slight diurnal regulation.
- Accuracy. Stage-discharge relation shifting. Rating curves good for low stages; fairly good for medium stages. Gage read once daily to tenths. Daily discharge ascertained by applying daily gage height to rating table. Records fairly good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF YADKIN RIVER AT NORWOOD, N. C.

	Year						
Week	1896	1897	1898	1899			
1		3,114	3,540	13,27			
2		2,997	3,323	19,92			
		2,259	3,160	11,14			
4		7,423	7,653	6,24			
		5,646	4,354	7,12			
6		22, 161	3,106	41,98			
7		8,483	3,486	16,53			
8		16,284	3,811	14,62			
		6,966	3,486	22,25			
10		18,807	4,789	17,49			
1		20,623	5,060	34,65			
			4,517				
		9,409					
13		6,309	11,866				
		19,203	9,149				
5		9,517	4,843	8,36			
		6,091	4,191	8,12			
		5,277	5,549	7,84			
~		8,443	3,323	6,96			
19		5,874	3,920	10,07			
		7,306	2,997	8,32			
21		5,549	7,871	6,06			
22		4,680	3,594	5,40			
23		7,263	1,986	4,72			
24		6,146	2,343	9,88			
25		4,463	4,300	4,40			
6		2,403	2,086	4,72			
27		3,703	2,306	5,50			
28		5,549	3,594	3,69			
29		6,927	2,779	3,10			
30		6,531	6,363	5,41			
31		3,431	4,680	5,26			
32		4,463	3,486	3,27			
33		3,377	6,377	3,14			
34		4,029	6,070	2,28			
35		2,951	7,014	3,21			
36	4,174	1,866	. 7,826	3,28			
37	2,029	1,646	3,403	3,32			
38	1,847	1,550	2,260	4,25			
39	1,833	1,889	22,719	2,58			
0	7,724	1,520	8,514	2,20			
1	1,980	4,400	5,277	4,26			
2	1,847	3,003	4,897	2,79			
13	1,946	3,377	9,749	2,20			
4	2,016	3,060	5,386	3,28			
15	2,010	2,580	5,874	3,50			
46	3,505		6,146	2,58			
17	2,574	2,134	7,123	2,45			
		1,969	4,843	2,71			
	3,343	5,140		2,75			
19	5,960	4,191	11,507	5,88			
50	4,109	3,169	4,951	2,76			
51	6,199	3,580	5,603	3,19			
52	3,437	5,060	8,295	3, 19			

Monthly Discharge of Yadkin River at Norwood, N. C. [Drainage area, 4,614 square miles]

	- I	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1896					
September	9,700	1,450	2,409	0.52	0.58
October	26,100	1,640	3,225	.70	.81
November	20,500	2,080	4, 176	.91	1.01
December	11,700	2,080	4,885	1.06	1.22
1897					
January	15,810	2,780	4,880	1.06	1.22
February	50,120	4,300	13,760	2.98	3.10
March.	33,330	5,440	13,017	2.82	3.25
April	45,010	5,060	9,755	2.11	2.35
May	14,400	4,300	6,388	1.38	1.59
June	14,400	3,160	5,397	1.17	1.31
July	15,810	2,400	5,495	1.19	1.37
August	6,580	2,400	3,712	.81	.93
September	2,780	1,310	1,774	.38	.43
October	11,800	1,480	2,999	.65	.75
November	8,480	1,820	2,973	.64	.71
December	7,340	2,080	4,171	.90	1.04
The year	50,120	1,310	6,193	1.34	18.05
January	11,330	2,780	4,506	0.98	1.13
February	4,300	2,780	3,445	.75	.78
March.	27,490	2,780	5,972	1.29	1.49
April	15,820	3,540	6, 128	1.33	1.48
May	18,000	2,400	4,469	.97	1.12
June	5,820	1,650	2,755	.60	.67
July	8,480	1,380	3,928	.85	.98
August	12,800	2,110	5,353	1.16	1.34
September	63,260	1,820	8,887	1.93	2.15
October	23,840	3,160	7,045	1.53	1.76
November	9,240	3,540	5,858	1.27	1.41
December	17,270	3,540	7,461	1.62	1.87
The year	63,260	1,380	5,484	1.19	16.18
1899	W- 00-	- 105	10.000		
January	51,000	5,400	12,026	2.61	3.00
February	66,750	5,820	22,070	4.78	4.97
March 1-18*		4,600	24,572	5.33	6.14
April 9-30	17 000	5,820	8,219	1.78	1.99
May	17,200	5,000	7,523	1.63	1.88 1.42
July	12,980	3,570	5,865	1.27	1.42
	14,180	2,670	4,489	.97	.83
August	7,500	2,080	3,321	.72	.83
September	8,760	2,080	3,355	.73	
November	6,240	1,790	2,840	.62	.71 .72
December	4,250	2,080	2,999	.65	.72
DOCCUMPEL	9,180	2,080	3,739	.81	.93

^{*}Approximate.

YADKIN RIVER NEAR PEEDEE, N. C.

LOCATION. At a private ferry about 1,500 feet below the dam of the Rockingham Power Co., half a mile below the mouth of Smith Creek, 1 mile above Partridge Creek, and 2 miles northeast of Peedee, Anson County.

Drainage Area. 6,830 square miles.

Records Available. August 9, 1906 to January 21, 1912, when station was

discontinued.

GAGE. Vertical staff gage on right bank above ferry landing; read by W. S. Ide.

DISCHARGE MEASUREMENTS. Made from ferry boat.
CHANNEL AND CONTROL. Bed of stream rough and irregular. Control not known.
Extremes of Discharge. Maximum stage recorded, 117.0 feet August 27, 1908 (discharge, 124,000 second-feet); minimum stage recorded, 86.4 feet August 1-2, 1911 (discharge, 1,560 second-feet).

ICE. Stage-discharge relation seldom if ever affected by ice.

REGULATION. The large power plant of the Rockingham Power Co., was put in operation January 21, 1912. The tailrace of the plant empties into the river below the gage so there is no flow past the gage at times when this plant is using all the flow of the river. There had not been much artificial regulation of the flow prior to January 21, 1912.

Accuracy. Stage-discharge relation permanent. Rating curve well defined between 4,000 and 15,000 second-feet, fairly well defined between 2,800 and 4,000 second-feet; extended below 2,800 and above 15,000 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good between 4,000 and 15,000 secondfeet and fairly good above and below those stages.

Cooperation. Gage height record furnished by engineers of the Rockingham

Power Co.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF YADKIN RIVER NEAR PEEDEE, N. C.

	Year									
Week	1906	1907	1908	1909	1910	1911	1912			
		11,509	16,429	8,763	3,659	15,060	9,0			
							7,75			
		6,054	34,271	7,683	4,331	5,696	1,1			
		5,223	10,643	11,763	4,084	4,131				
		4,791	6,946	6,931	9,874	4,043				
		4,853	11,871	5,537	11,631	3,700				
		7,669	8,543	10,043	5,603	7,186				
		5,456	32,871	9,043	11,277	7,571				
		8,614	15,171	11,843	13,231	4,700				
		12,114	9,120	10,234	17,060	3,957				
		7,500	8,889	9,000	9,000	5,779				
		10,369	12,026	8,289	7,231	7,940				
		6,100	23,306	6,389	5,004	5,914				
		4,820	12,760	12,331	4,310	6,357				
		8,007	9,031	6,491	4,133	7,656				
		7,117	6,254	7,094	3,789	11,320				
		5,529	8,389	8,046	6,303	10,526				
		13,483	6,254	5,957	4,280	5,581				
		7,206	6,920	17,434	3,619	4,580				
		7,077	6,557	6,466	8,356	3,900				
		4,763	5,480	5, 134	3,934	4,383				
		4,514	7,160	25,557	4,343	3,066				
		12,803	4,703	8,754	3,520	2,534				
		8,363	7,354	27,871	3,459	3,764				
		17,629	6,383	15,343	21,440	3,047				
		5,766	6,024	14,554	7,757	3,391				
		8,917	5,357	10,549	5,114	2,933				
		6,351	15,871	8,291	4,271	2,299				
3		6,477	7,934	6,440	6,883	2,537				
		6,134	4,346	5,313	8,383	3,746				
)		4,181	8,146	6,777	3,911	1,973				
		4,401	5,037	23,927	3,771	1,870				
		4,676	6,961	10,229	6,191	3,277				
3		4,283	3,843	7,834	3,313	2,213				
	13,289	4,187	36,726	4,837	4,619	2,129				
5	32,443	2,669	39,906	4,146	6,056	7,201				
5	12,663	3,709	12,880	3,447	12,323	6,669				
	7,623	3,567	6,399	3,560	5,169	2,794				
3	7,109	2,564	4,043	5,914	3,039	2,809				
	6,849	8,270	5,566	5,413	2,769	4,663				
)	9,691	4,167	4,236	3,283	2,957	2,310				
	6,431	3,094	11,937	3,707	9,860	2,566				
	13,706	2,613	4,676	4,086	4,210	10,230				
	9,177	2,534	16,280	3,760	3,893	8,750				
	5,920	2,931	17,571	3,310	2,957	3,486				
	5,317	3,261								
	5,317		6,397	3,503	3,039	8,539				
		3,174	12,994	3,817	2,903	6,263				
	10,657	13,221	6,360	3,310	2,903	5,126				
	5,763	8,886	5,380	3,201	2,850	4,940				
	5,191	4,133	6,186	3,229	5,043	3,706				
)	6,731	19,489	7,769	6,223	3,713	4,104				
	8,094	10,426	12,746	4,756	3,147	14,906				
	6,128	23,008	16,502	3,711	5,006	22,558				

MONTHLY DISCHARGE OF YADKIN RIVER NEAR PEEDEE, N. C. [Drainage area, 6,830 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1906					
August	52,700	5,000	16,300	2.39	2.04
September	49,400	5,380	10,700	1.57	1.75
October	32,100	4,940	9,410	1.38	1.59
November	23,000	4,940	6,720	.984	1.10
December	10,800	4,940	6,450	.944	1.09
1907					
January	21,300	4,520	6,680	.978	1.13
February	15,400	4,520	7,590	1.11	1.16
March	17,800	4,520	7,780	1.14	1.31
April	27,900	4,730	8,400	1.23	1.37
May	9,200	3,700	5,690	.833	.96
June	30,700	4,940	11,400	1.67	1.86
July	12,700	3,310	5,890	.862	.99
August	7,240	2,560	4,160	.609	.70
September	21,000	2,210	4,380	.641	.72
October	6,280	2,380	3,090	.452	.52
November	30,000	2,930	6,680	.978	1.09
December	41,700	3,700	14,000	2.05	2.36
The year	41,700	2,210	7,145	1.05	14.17
1908			10.100	0.00	0.50
January	48,500	5,820	16,100	2.36	2.72
February	49,400	7,240	17,100	2.50	2.70
March.	43,700	7,240	13,700	2.01	2.32 1.22
April	12,200	5,820	7,450 6,310	1.09	1.22
May	10,200	4,520	6,200	.924	1.07
June	15,100	4,100 3,700	8,710	1.28	1.48
July	23,400	3,700	20,000	2.93	3.38
August	124,000		7,320	1.06	1.18
September	20,400 33,200	3,700 3,700	10,900	1.60	1.18
October November	25,800	5,160	8,370	1.23	1.37
December	50,200	4,940	10,600	1.55	1.79
The year	124,000	3,500	11,063	1.62	22.08
1909					
January	17,200	5,820	8,500	1.24	1.43
February	25,100	4,940	9,890	1.45	1.51
March.	16,600	5,820	8,910	1.30	1.50
April	15,400	5,380	6,910	1.01	1.13
May	46,500	4,520	13,400	1.96	2.26
June	51,000	6,760	16,300	2.39	2.67
July	14,500	4,100	7,090	1.04	1.20
August	48,500	3,700	10,600	1.55	1.79
September	9,200	3,310	4,540	.665	.74
October	6,280	3,120	3,670	.537	.62
November	4,520	3,120	3,460	.507	.57 .74
December	11,100	2,740	4,370.	.640	.74
The year	51,000	2,740	8,136	1.19	16.16

MONTHLY DISCHARGE OF YADKIN RIVER NEAR PEEDEE, N. C .- Continued

]	Discharges in	Second-feet			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1910						
January	21,000	2,930	6,590	0.965	1.1	
February		4,940	9,460	1.39	1.4	
March		4,100	8,730	1.28	1.4	
April		3,500	4,590	.672	.7	
May		3,120	4,950	.725	.8	
June		2,560	8,980	1.31	1.4	
Julv		2,930	5,620	.823	.9	
August		2,560	4,440	.650	.7	
September		2,560	6,220	.911	1.0	
October		2,930	5,010	.734	3.	
November	3,310	2,560	2,920	.428	.4	
December	9,450	2,560	4,170	.611	.7	
The year	44,100	2,560	5, 973	.87	11.8	
1911 January	31,400	3,700	6,890	1.01	1.1	
February		3,500	5,820	.852		
March		3,310	6,200	.908	1.0	
April	22,400	4,520	8,520	1.25	1.4	
May	5,380	2,560	3,770	.552	.6	
June	5,820	2,210	3,200	.469		
July	7,480	1,640	2,600	.381	.4	
August	1,6,600	1,560	2,950	.432		
September	14,500	1,880	4,690	.687	.1	
October	24,400	2,120	5,770	.845	.9	
November	21,000	2,930	5,850	.857		
December	37,400	3,120	10,100	1.48	1.7	
The year	37,400	1,560	5,530	.81	11.0	
1912 January 1-18	11,300	4,730	7,770	1.14	0.7	

FISHER RIVER NEAR DOBSON, N. C.

LOCATION. At Turkey Ford steel highway bridge on Dobson-Ararat highway, about 2 miles east of Dobson, Surry County.

Drainage Area. 109 square miles (measured on topographic maps).
Records Available. September 1, 1920 to December 31, 1923.
Gage. Standard enameled staff gage fastened to tree on left bank about 20 feet above bridge; read by Miss Ada Kidd.

DISCHARGE MEASUREMENTS. Made from lower side of bridge.

CHANNEL AND CONTROL. Channel is straight above and below gage; rather rough.

Banks are subject to overflow above gage height 10 feet. Control is shoal

about 50 feet below gage; practically permanent.

EXTREMES OF DISCHARGE. 1920-1923: Maximum stage recorded, 10.1 feet at 5 p.m. March 16, 1923 (discharge, 6,700 second-feet); minimum stage recorded, 0.34 foot at 7 a.m. and 5 p.m. July 27, 1923 (discharge, 42 second-feet).

ICE. Stage-discharge relation probably not affected by ice.

REGULATION. Probably none.

Accuracy. Stage-discharge relation permanent. Rating curve well defined between 54 and 300 second-feet and extended above by comparison with Ararat River near Pilot Mountain, N. C., and therefore should be used with caution. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records probably good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF FISHER RIVER NEAR DOBSON, N. C.

STATE OF THE PARTY	Year							
Week	1920	1921	1922	1923				
9-7-			100					
		149	106	2				
2		254	132	1				
3		234	156	1				
4		268	158	1				
5		307	236	2				
3		483	234	1				
7		301	254	2				
3		320	181	1				
		263	332	1				
		218	362	2				
		159	398	1,0				
		. 174	237	3				
*		172	453	1				
		181	249	1				
		171	199	1				
		201	211	1				
		191	222	1				
		214	402	1				
		184	245	1				
		182	484	1				
		195	244	1				
		167	501	i				
			1,034	1				
		176		1				
		151	267					
		141	253					
		159	206					
		151	394	1				
		152	412					
		193	444					
		194	216					
		169	169	a line and l				
		214	157	2				
		214	213					
		110	166	1				
		90	157					
	167	97	141	1				
	161	78	119	1				
	148	84	103	2				
	346	84	98					
	162	91	138					
	143	73	202					
	151	70	119]				
	156	71	113					
	148	437	104					
	156	134	105					
	319	117	107					
	206	117	103	and they				
	191	159	100					
		149	115	1.43 7 3				
	208		115					
)	677	110	151					
	213	141	131					
2	174	110	101					

Monthly Discharge of Fisher River Near Dobson, N. C. [Drainage area, 109 square miles]

		Discharges in	Second-feet	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1000		-			
1920 September	1,120	119	198	1.82	2.08
October	185	125	153	1.40	1.61
November	650	119	207	1.90	2.12
December	2,050	154	308	2.83	3.26
1921	2,000	101	900		0.20
January	760	135	234	2.15	2.48
February	1,440	276	350	3.21	3.34
March	255	151	189	1.73	1.99
April	243	151	188	1.73	1.93
May	243	154	193	1.77	2.04
June	208	122	156	1.43	1.60
July	243	104	172	1.58	1.82
August	243	76	163	1.50	1.73
September	158	68	86.6	.794	.89
October	1,500	65	134	1.23	1.42
November	485	104	145	1.33	1.48
December	255	101	131	1.20	1.38
The year	1,500	65	178	1.64	22.10
1922					
January	298	94	137	1.26	1.45
February	1,120	125	255	2.34	2.44
March	1,060	193	374	3.43	3.95
April	364	175	225	2.06	2.30
May	1,310	178	328	3.01	3.47
June	1,980	196	519	4.76	5.31
July	1,640	164	350	3.20	3.70
August	485	125	174	1.60	1.84
September	171	94	117	1.07	1.19
October	568	82	139	1.28	1.48
November	119	94	104	.954	1.06
December	320	91	127	1.17	1.35
The year	1,980	82	237	2.18	29.54
January	940	98	173	1.59	1.83
February	650	116	187	1.72	1.79
March	4,100	116	396	3.63	4.18
April	255	135	165	1.51	1.68
May	388	110	156	1.43	1.65
June	161	62	104	.954	1.06
July	223	42	81.5	.748	.86
August		76	152	1.39	1.60
September.	940	71	173	1.59	1.77
October	154	76	96.6	.886	1.02
November	540	85	142	1.30	1.02
December	595	113	167	1.53	1.45
The year	4,100	42	166	1.52	20.65

ARARAT RIVER NEAR PILOT MOUNTAIN, N. C.

Location. At steel highway bridge on Ararat road, R.F.D. Route No. 3, about a mile below mouth of Tom's Creek, 1½ miles upstream from old Douglas Ford and 5 miles west of Pilot Mountain, Surry County.

Drainage Area. 250 square miles.

RECORDS AVAILABLE. July 28, 1920 to October 31, 1922, when the station was discontinued because of backwater from dam under construction a quarter of a mile downstream.

GAGE. Standard enameled staff gage fastened to downstream side of pier at left bank; read by Martin A. Fulk.

DISCHARGE MEASUREMENTS. Made from downstream side of highway bridge to

which gage is attached.

CHANNEL AND CONTROL. Channel is straight and smooth above and below gage.

Banks are about 10 feet high and are rarely overflowed. Control is a rock shoal about 75 feet downstream from gage; excellent for stages below 10 feet. Rock bluffs farther downstream make perfect high water control.

Extremes of Discharge. 1920-1922: Maximum stage recorded, 6.6 feet at 7 a.m. May 19, 1922 (discharge, 5,520 second-feet); minimum stage recorded, 0.30 foot at 8 a.m. September 20, 1921 (discharge, 70 second-feet).

ICE. Probably not enough to affect stage-discharge relation.

REGULATION. Two hydro-electric power plants on the river above may seriously

affect the low water flow; their storage however is relatively small.

Accuracy. Stage-discharge relation permanent. Rating curve well defined between 165 and 2,550 second-feet and probably accurate up to 6,000 secondfeet. Gage read to hundredths twice daily which may compensate for regulation because the storage at the power plants is relatively small. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF ARARAT RIVER NEAR PILOT MOUNTAIN, N. C.

		Year				Year	
Week			*	Week			
	1920	1921	1922		1920	1921	1922
1		392	192	27		264	666
2		926	256	28		388	628
3		653	305	29		515	768
4		564	319	30		320	423
5		576	441	31	·	517	370
6		978	553	32	525	247	358
7		569	954	33	653	258	492
8		803	379	34	612	180	27
9		495	783	35	401	178	26
10		441	792	36	335	236	64
1		434	868	37	289	218	32
12		426	524	38	294	202	19
13		465	767	39	587	179	16
14		416	513	40	330	184	49
15		406	423	41	253	163	48.
16		904	459	42	221	153	20
17		471	442	43	224	140	21
18		501	862	44	223	1,003	
19		457	661	45	226	303	
20		424	1,521	46	634	249	
21		416	616	47	326	253	
22		374	888	48	1,220	369	
23		415	1,125	49	590	292	
24		317	503	50	1,113	225	
25		266	564	51	508	232	
26		605	439	52	485	194	2

Monthly Discharge of Ararat River Near Pilot Mountain, N. C. [Drainage area, 250 square miles]

		Discharges i	n Second-fee	et	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1920					
August	1,200	235	516	2.06	2.38
September	1,360	235	373	1.49	1.66
October	455	176	253	1.01	1.16
November	2,980	200	533	2.13	2.38
December	3,860	405	682	2.73	3.15
1921					
January	3,420	360	628	2.51	2.89
February	3,090	455	726	2.90	3.02
March	• 670	405	443	1.77	2.04
April	2,350	360	547	2.19	2.44
May	700	360	442	1.77	2.04
June	1,200	255	397	1.59	1.77
July	1,600	218	414	1.66	1.91
August	338	162	235	.94	1.08
September	588	106	205	.82	92
October	3,310	97	285	1.14	1.31
November	1,520	218	342	1.37	1.53
December	430	148	240	.96	1.11
The year	3,420	106	408	1.63	22.06
1922					
January	670	168	267	1.07	1.23
February	2,050	315	546	2.18	2.27
March	1,960	405	778	3.11	3.58
AprilMay	822	382	469	1.88	2.10
	3,750	382 360	871	3.48	4.01 3.31
June July	2,050 1,520	360	743	2.97	2.78
August	1,520 822	382 196	602 353	2.41 1.41	1.63
September	2,550	196			1.03
October	1,440	140	325 330	1.30	1.45
October	1,440	140	530	1.32	1.52

SANTEE RIVER BASIN

SANTEE RIVER AT FERGUSON, S. C.

LOCATION. At Ferguson boat landing, three-fourths mile from railroad station, in Orangeburg County, 4 miles downstream from mouth of Eutaw Creek, 6 miles northeast of Eutawville, S. C., and 15 miles upstream from mouth of old Santee-Cooper Canal.

Drainage Area. 14,800 square miles.

RECORDS AVAILABLE. December 1, 1907 to December 31, 1923.

GAGE. A vertical staff gage with enamel face is attached to a cypress pile driven into river bottom near right bank at boat landing. This gage was established September 21, 1907. On November 23, 1921 an automatic water-stage recorder, Gurley 7-day graph, was placed in a well and shelter about 10 feet below staff gage. Recorder is set with the staff gage. According to the U. S. Weather Bureau, the datum of rod gage has never been changed. Mr. H. C. Savage, reads rod gage daily and attends to recorder.

DISCHARGE MEASUREMENTS. Made from downstream side of steel railroad bridge

1 mile above gage.

CHANNEL AND CONTROL. The channel up to 12 feet is deep, narrow and probably permanent. Left bank above 12 foot stage is a flat swamp 3½ miles wide. Right bank is a flat swamp and about one-half mile wide and somewhat lower than left bank. Control is not definitely known as there are no shoals or riffles below Ferguson. However, much of the river banks and bottom are limestone and marl and it is believed that control is fairly permanent. Current is good at all stages and slope of surface is very even for 50 miles downstream. Extremes of Discharge. 1907-1923: Maximum stage recorded, 24.5 feet on July 22, 1916 (estimated discharge, 368,000 second-feet); minimum stage recorded, 0.9 foot October 23, 1918 (discharge not estimated). Minimum stage probably caused by regulation of strongs recovering above.

stage probably caused by regulation of storage reservoirs above.

Ice. None.

DIVERSIONS.

None.

Two large hydro-electric plants have fairly large reservoirs on the REGULATION. Broad River, there are a number of reservoirs on Wateree River, two of which are very large, and there is at least one reservoir on Saluda River. Apparently the Parr Shoals reservoir on Broad River and Camden reservoir on Wateree River have the most effect. As the two are about equidistant from Ferguson the storage effect probably reaches the gage about the same time. There are no daily fluctuations, probably because the nearest reservoir is more than a hundred miles upstream. However, there is a very distinct weekly fluctuation during average and low water periods caused apparently by shutdown of plants on Saturday afternoons and Sundays. On Mondays the stage at Ferguson begins to drop and continues with accelerated rapidity until some time during Tuesday. After reaching the lowest point the stage rises rapidly and is back to an even stage by Wednesday night. During the rest of the week there is comparatively little fluctuation.

Accuracy. Stage-discharge relation practically permanent. Rating curve well defined between 6,000 and 16,000 second-feet. Above 16,000 second-feet rating is based on an extended curve which is fairly accurate up to 20,000 secondfeet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage heights obtained by

inspecting gage height graph. Records good.

PERATION. This station is part of Federal Power Commission Project No. 199.

All field expenses, equipment and operation costs paid by Columbia Railway. COOPERATION. and Navigation Company, permittees.

MEAN WEEKLY DISCHARGE, IN SECOND-

	Year									
Week	1907	1908	1909	1910	1911	1912	1913	1914		
		38,929	26,443	10,929	14,757	39,000	14,543	37,50		
2		41,071	21,857	11,471	27,971	32,043	13,686	41,24		
3		59,857	19,071	10,826	14,857	37,171	11,383	17,11		
4		25,286	24,643	17,143	10,157	22,114	15,219	13,91		
5		20,886	16,643	23,800	9,120	21,500	48,686	13,54		
6		31,914	15,543	23,900	9,119	26,771	34,314	16,80		
7		3,5429	30,986	20,586	15,886	24,386	23,129	20,85		
3		51,714	26,729	29,071	12,071	61,143	22,657	22, 45		
9		28,150	33,743	43,143	9,583	50,375	26,400	29,8		
		20,343	24,929	45,714	9,160	43,143	44,929	29,8		
1		20,271	32,671	24,986	10,099	44,000	31,100	20,7		
		21,471	32,671	15,771	10,186	125,857	68,429	17,7		
3		55,971	23,814	13,500	12,590	35,214	36,857	14,6		
4		28,443	24,829	11,414	11,680	38,071	33,314	16,1		
5		18,786	17,343	10,061	21,357	27,357	20,886	16,4		
6		20,329	16,143	11,914	27,714	24,157	30,200	28,9		
7		22,557	14,600	10,433	21,343	39,000	21,100	25,3		
8	<i></i>	21,386	18,414	8,491	12,086	33,614	14,329	13,9		
9		16,329	38,486	12,539	9,974	29,143	11,486	9,7		
0		13,243	18,814	21,857	8,430	33,857	11,486	7,5		
1		16,100	28,329	13,771	7,247	31,243	12,520	7,2		
2		13,071	38,100	12,386	6,903	17,414	18,129	6,0		
3		11,943	44,571	10,223	5,756	21,029	15,900	8,1		
4		12,043	53,857	17,886	6,169	28,914	21,029	8,5		
5		14,543	39,286	37,386	5,906	32,557	13,514	8,2		
6		20,943	27,100	24,471	5,491	19,057	12,151	6,8		
7		19,171	26,543	23,286	5,257	20,671	11,757	8,5		
88		28,371	28,400	20,329	5,581	27,229	9,977	15,0		
9		20,557	25,143	20,300	8,390	25,486	8,200	8,4		
00		14,286	16,171	17,086	6,286	23,586	12,214	6,5		
1		16,014	22,014	9,513	4,323	13,729	16,271	7,9		
2		13,776	34,600	13,971	9,297	14,214	14,500	10,6		
3		13,554	25,129	13,057	5,944	14,200	12,414	15,4		
4		17,157	23,029	10,117	4,420	13,757	10,737	8,6		
5		190,586	12,186	11,056	5,623	11,614	9,487	8,5		
6		80,571	10,490	28,571	13,014	7,344	9,600	6,8		
		24,157	9,383	25,571	11,761	8,446	8,757	5,0		
8		14,500	17,280	10,171	5,461	10,847	12,986	5,0		
		11,343	25,500	8,883	9,061	18,074	19,686	6,9		
0		11,904	13,714	11,269	9,706	22,886	9,530	5,6		
1		12,761	11,569	19,097	5,827	9,531	8,014	9,0		
2		14,500	14,157	29,729	10,834	10,621	6,600	11,2		
3		14,014	12,943	13,986	26,043	20,243	13,606	16,8		
1		28,714	10,369	8,526	24,671	11,829	16,914	8,4		
5		31,957	10,957	7,840	13,633	14,173	10,577	5,7		
		21,243	10,666	9,283	28,957	40,214	20,943	9,1		
7		23,000	9,851	7,616	16,914	14,400	11,319	16,4		
8		15,229	9,137	6,206	11,786	10,497	8,129	9,1		
9	21,214	12,729	9,183	5,957	11,871	10,969	15,454	32,0		
0	15,957	17,243	11,844	11,854	8,369	10,933	13,814	51,2		
1	31,986	15,143	18,957	9,296	22,657	9,529	9,760	25,9		
2	38,087	29,962	13,625	10,792	54,000	13,425	15,145	27,1		

FEET, OF SANTEE RIVER AT FERGUSON, S. C.

				Year				
1915	1916	1917	1918	1919	1920	1921	1922	1923
51,714	35, 114	11,154	7,071	37,071	13,244	27,014	12, 159	21,014
46,643	29,443	11,771	10,079	38,900	11,140	20,214	15,414	22,214
49,143	18,186	12,056	22,657	22,957	12,471	37,886	21,486	17,643
54,714	14,486	16,700	20,457	25,486	13,100	37,286	20,757	16,000
33,057	16,514	18,414	23,257	43,643	34,929	31,171	19,271	21,486
43,971	62,871 31,986	20,014 12,971	39,800	25,543	41,000 33,614	37,143 100,143	28,300 37,286	23,014 (33,243 7
28,986 23,757	16,314	18,671	20,514 17,300	20,429 28,029	27,571	40,786	70,143	21,900 8
26,814	20,062	46,143	14,243	41.243	20,375	28,257	28,743	21,014
29,929	30,457	44,514	13,269	39,714	21,843	22,314	37,971	31,971 10
36,757	25,471	35,129	10,553	45,714	30,186	19,457	50,000	28, 157 11
20,586	14,357	20,500	12,700	28,486	37,214	16,300	35,429	68,429 12
16,929	13,200	32,114	11,743	20,271	31,657	18,971	30,500	37, 171 13
20,843	13,186	36,929	9,530	18,186	46,143	17,143	25,429	23,800 14
21,014	16,500	46,143	17,876	17,843	44,857	15,200	45,886	26,829 18
14,529	12,347	28,529	19,871	19,986	31,114	16,200	28,214	25,757 16
12,929	10,464	15,300	30,586	15,429	27,186	16,271	32,429	21,900 1
11,343	9,316	12,771	24,014	15,229	24,614	15,371	25,171	19,243 18
16,571	7,851	15,943	13,371	22,414	18,086	14,743	27,800	20,714 19
22,886	7, 297	12,043	15,700	39,786	15,829	24,986	22,914	18,429 20
15,543	9,054	9,216	14,786	31,329	15,100	25,843	32,114	20,386 21
17,543	16,971	11,757	10,573	19,500	12,957	19,200	25,343 32,357	25,143 25 29,257 25
27,043	11,707 15,100	10,494	10,811	15,471	15,700 15,657	14,486 12,090	27,243	19,671 24
18,329 16,529	20,129	15,671 14,043	8,541 7,891	13,114 12,200	13,286	12,090	19,229	13,314 35
12,276	17,557	8,441	8,384	20,929	13,790	12,580	18,557	12,690 26
10,654	15,700	11,386	10,154	23,114	12,957	11,826	15,329	12,561 2
12,619	19,886	12,404	7,096	18,614	12,529	13,543	17,571	10,949 28
10,190	170,857	10,206	6,557	20,329	14,157	19,700	19,329	11,791 29
10,109	202,571	21,414	9,807	102,357	21,327	25,157	24,643	10,741 30
6,957	66,714	16,300	17,214	41,057	16,343	15,829	19,829	14,329 3
12,521	32,643	13,243	24,114	19,586	14,800	15,686	17,529	13, 214 3
15,900	22,814	8,714	11,857	29,043	27,329	14,971	21,586	13,357 3
19,086	15,514	8,127	8,793	25,700	38,071	11,943	20,386	15,871 34
17,200	14,414	6,917	7,209	13,686	38,929	11,290	13,329	17,257 35
13,900	13,129	21,057	6,714	13,169	36,114	8,159	10,240	20,971 36 12,643 3
13,294 8,783	11,029 13,043	19,771 8,136	11,620 7,803	8,481	25,386 18,286	9,479 9,249	9,651 8,366	10,243 38
6,610	8,823	8,136	11,357	8,433	16,900	14,857	7,846	12,729 39
11,331	12,529	18,057	6,684	6,697 5,461	21.043	14,614	7,353	10,033 4
21,157	8,696	8,091	5,759	5, 563	16,229	9,586	14,499	8,446 4
13,506	8,153	7,123	4,111	5,903	11,034	8,040	18,486	7,383 45
15,043	14,986	8,919	6,543	11,434	9,357	6,601	18,400	6,543 43
10,034	8,646	12,540	40,043	11,700	11,114	10,291	10,360	7,117 4
7,924	8,589	9,587	50,457	9,294	11,269	15,671	9,799	11,049 4
7,391	7,229	7,310	15,900	9,609	11,231	11,070	9,760	8,423 40
18,004	7,071	6,961	17,700	9,229	17,500	14,214	10,173	8,289 4
18,329	7,481	6,464	16,443	8,224	13,926	14,629	9,049	9,219 48
10,949	8,611	6,607	29,043	8,294	24,843	16,300	9,467	13,641 49
10, 291	9,919	7,319	14,929	22,729	29,114	12,783	11,704	20,029 50
15,400	10,959	6,987	27,929	33,857	33,429	13,286	16,129 23,312	20,129 51 16,750 55
22,325	9,736	- 6,517	52,625	12,449	.27,162	11,115	20,012	10, 790 97

MONTHLY DISCHARGE OF SANTEE RIVER AT FERGUSON, S. C. [Drainage area, 14,800 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907					
December	53,000	. 11,300	27,500	1.86	2.1
1908			00.000	0.07	
January	83,000	19,600	39,200	2.65	3.0
February March	68,000	20,800	36,300 28,200	2.45	2.6
Maren	77,000 44,000	17,800	23,200	1.57	2.2 1.7
May	23,200	16,200 11,800	16,200	1.09	1.7
June	24,000	11,800	14,300	.966	1.0
July	32,500	11,300	20,500	1.39	1.6
August	344.000	9,430	36,600	2.47	2.8
September	323,000	10,800	50,100	3.39	3.7
October	23,200	9,430	14,100	.953	1.1
November	41,000	14,800	25,000	1.69	1.8
December	47,000	12,300	18,800	1.27	1.4
The year	344,000	9,430	26,875	1.82	24.6
1909			=======================================		
January	38,000	17,100	22,600	1.53	1.7
February	38,000	14,200	23,800	1.61	1.6
March	41,000	22,500	29,600	2.00	2.3
April	27, 200	13,700	18,400	1.24	1.3
May	65,000	14,900	28,800	1.95	2.2
June	101,000	24,000	40,500	2.74	3.0
July	32,500	13,500	23,900	1.61	1.8
August	41,000	11,000	24,300	1.64	1.8
September	28,800	8,140	15,400	1.04	1.1
October November	18,300	9,580	12,900	.872	1.0
December	12,600 23,200	8, 140 7, 340	10,300 13,100	.696 .885	.7 1.0
The year	101,000	7,340	21,967	1.48	20.1
1910					
January	19,300	9,580	13,100	0.885	1.0
February	44,000	16,400	26,900	1.82	1.9
March	50,000	12,300	27,800	1.88	2.1
April	14,600	8,420	11,000	.743	.8
May	27,200	7,340	14,200	.959	1.1
uly	44,000	9,430	21,400	1.45	1.6
August	26,000	10,700	19,600 11,500	1.32	1.5
eptember	18,000 38,000	7,730	18,000	1.22	1.3
October	35,000	6,340 9,580	17,700	1.22	1.3
November	9,880	6,100	7,800	.527	.5
December	14,800	5,030	9,290	.628	.75
The year.	50,000	5,030	16,524	1.12	15.15

MONTHLY DISCHARGE OF SANTEE RIVER AT FERGUSON, S. C.—Continued

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1911					
January	35,000	8,420	16,300	1.10	1.27
February	17,100	7,080	11,600	.784	.82
March	16,400	7,340	10,100	.682	.79
April	30,500	9,730	20,100	1.36	1.52
May	12,600	5,880	9,010	.609	.70
June	7,340	4,120	5,900	.399	.45
July	10,300	4,120	6,280	.424	.49
August	12,000	3,520	5,840	.395	.46
September	16,900	4,120	10,000	.676	.75
October	32,500	4,200	14,500	.980	1.13
November	38,000	8,700	18,600	1.26	1.41
December	80,000	6,820	24,600	1.66	1.91
The year	80,000	3,520	12,736	.86	11.70
1912					0.44
January	50,000	14,600	30,900	2.09	2.41
February	83,000	14,600	37,600	2.54	2.74
March	209,000	32,500	61,500	4.16	4.80
April	50,000	20,000	32,600	2.20	2.46
May	41,000	16,600	29,700	2.01	2.32
June	41,000	16,900	24,800	1.68	1.87
July	28,800	13,900	23,500	1.59	1.83
August	18,000	10,800	13,600	.919	1.06
September	27,200	6,340	11,100	.750	.84
October	30,500	8,420	15,500	1.05	1.21
November	53,000	8,700	19,200	1.30	1.45
December	15,300	7,600	11,300	.764	.88
The year	209,000	6,340	25,942	1.75	23 .87
January	50,000	9,130	16,400	1.11	1.28
February	56,000	20,000	30,600	2.07	2.16
March	98,000	25,000	43,100	2.91	3.36
April	38,000	14,600	26,300	1.78	1.99
May	18,600	8,560	13,100	.885	1.02
June	23,200	9,280	16,000	1.08	1.21
July	16,200	6,700	11,000	.743	.86
August	17,800	6,700	12,700	.858	.99
September	23,200	6,700	12,700	.851	.95
October	19,600	6,100	10,400	.703	.81
November	25,000	7,600	13,300	.899	1.00
December	20,800	7,340	13,300	.899	1.04
The year	98,000	6,100	18,233	1.23	16.67

MONTHLY DISCHARGE OF SANTEE RIVER AT FERGUSON, S. C .- Continued

		Discharges in	n Second-fee	t		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1914						
January	53,000	11,000	26,100	1.76	2.0	
February	28,800	12,100	20,000	1.35	1.4	
March	35,000	13,500	22,300	1.51	1.7	
April	44,000	11,500	21,200	1.43	1.6	
May	16,200	5,880	9,000	.608	.7	
June	10,700	5,330	7,710	.521	.5	
July	17,300	4,280	9,360	.632	.7	
August	16,700	5,550	10,500	.709	.8	
September	12,000	4,280	14,100	.953	1.0	
October	21,900	4,830	10,600	.716	.8	
November	19,300	4,370	9,770	.660	.7	
December	62,000	6,340	32,300	2.18	2.5	
The year	62,000	4,280	16,078	1.09	14.7	
1915 January	71,000	32,500	49,300	3,33	3.8	
February	50,000	21,400	30,700	2.07	2.3	
March	47,000	15,700	26,900	1.82	2	
April	26,000	11,800	17,100	1.16	1.5	
May	25,000	8,700	16,700	1.13	1.3	
June	32,500	10,200	18,800	1.27	1.4	
July	16,000	6,460	10,600	.716		
August	20,400	6,460	14,600	.986	1.	
September	18,000	5,230	11,100	.750		
October	23,200	6,100	15,000	1.01	1.	
November	26,000	5,550	12,400	.838		
December	27,200	8,280	14,800	1.00	1.1	
The year	71,000	5,230	19,833	1.34	18.	
1916 January	50,000	13,300	23,400	1.58	1.8	
February	104,000	14,400	31,700	2.14	2.5	
March	35,000	11,500	21,300	1.44	1.0	
April	17,300	7,730	13,100	.885		
May	19,600	5,330	9,620	.650		
June	21,900	8,420	16,000	1.08	1.5	
July	368,000	13,500	100,000	6.76	7.1	
August	71,000	13,700	26,200	1.77	2.0	
September.	16,900	7,470	11,700	.791	` .	
October	16,900	6,460	10,900	.736	.8	
November	11,000	6,220	7,580	.512		
December	14,900	7,600	9,710	.656		
The year	368,000	5,330	23,434	1.58	21.6	

MONTHLY DISCHARGE OF SANTEE RIVER AT FERGUSON, S. C .- Continued

		Discharges i	n Second-fee	et		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1917						
January	20,800	7,860	13,500	0.912	1.05	
February	44,000	11,000	20,000	1.35	1.41	
March	74,000	19,600	* 35,200	2.38	2.74	
April	53,000	12,100	31,100	2.10	2.34	
May	16,700	7,080	12,500	.845	.97	
June	18,900	6,950	12,100	.818	.91	
July	26,000	5,990	14,000	.946	1.09	
August	16,400	5,660	10,300	.696	.80	
September	27,200	6,580	14,000	.946	1.06	
October	22,500	5,880	10,200	.689	.79	
November	18,000	4,730	8,820	.596	.67	
December	8,560	4,830	6,880	.465	.54	
The year	74,000	4,730	15,717	1.06	14.37	
January	28,800	5,660	15,400	1.04	1.20	
The state of the s			24,900	1.68	1.75	
March	50,000 15,800	13,500 8,840	12,300	.831	.96	
April	41,000	7,600	19,600	1.32	1.47	
May	30,500	9,280	15,600	1.05	1.21	
June	12,800	6,220	9,110	.616	.69	
July	14,400	4,730	8,770	.593	.68	
August	26,000	5,030	13,800	.932	1.07	
September	14,800	5,030	9,360	.632	.71	
October	20,400	3,480	7,030	.475	.55	
November	80,000	11,100	29,600	2.00	2.23	
December	68,000	13,000	31,100	2.10	2.42	
The year	80,000	3,480	16,381	1.11	14.94	
1919 January	50,000	20,000	32,100	2.17	2.50	
February	50,000	19,300	28,700	1.94	2.02	
March	53,000	19,600	35,700	2.41	2.78	
April	20,800	10,500	17,600	1.19	1.33	
May	47,000	12,500	26,900	1.82	2.10	
June	26,000	10,000	15,100	1.02	1.14	
July	146,000	14,200	42,900	2.90	3.34	
August	41,000	12,300	23,600	1.59	1.83	
September	15,100	5,660	9,450	.639	.71	
October	16,700	4,120	7,500	.507	.58	
November	12,600	5,770	9,460	.639	.71	
December	44,000	5,990	18,400	1.24	1.43	
The year	146,000	4,120	22,284	1.50	20.47	

Monthly Discharge of Santee River at Ferguson, S. C.—Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1920					
January	30,500	7,600	13,600	0.919	1.06
February	47,000	20,800	33,600	2.27	2.45
March	44,000	17,300	28,500	1.93	2.28
April	53,000	24,000	37,000	2.50	2.79
May	27,200	12,500	17,600	1.19	1.37
June	18,600	10,200	14,400	.973	1.09
July	24,000	9,430	15,300	1.03	1.19
August	44,000	10,700	26,500	1.79	2.00
September	44,000	15,300	25,500	1.72	1.95
October	21,900	6,950	14,100	. 953	1.10
November	20,000	7,340	12,800	.865	.97
December	38,000	17, 100	27,900	1.89	2.18
The year.	53,000	6,950	22,233	1.50	20 .41
January	53,000	17,800	30,300	2.05	2.36
February	149,000	27,200	52,600	3.55	3.70
March	27,200	14,400	20,200	1.36	1.57
April	19,300	12,800	16,300	1.10	1.23
May	30,500	12,600	20,400	1.38	1.59
June	18,000	9,130	13,400	.905	1.01
July	27,200	9,880	17,600	1.19	1.37
August	18,000	8,700	13,700	.926	1.07
September	17,500	5,550	10,500	.709	.79
October	17,800	4,730	9,560	.646	.74
November	18,900	5,660	13,400	.905	1.01
December	17,500	8,140	13,500	.912	1.05
The year	149,000	4,730	19,288	1.30	17.49
January	23,200	9,130	17,800	1.20	1.38
February	101,000	17,300	40,000	2.70	2.81
March	56,000	25,000	37, 200	2.51	2.89
April	59,000	25,000	32,600	2.20	2.46
May	38,000	21,400	27,000	1.82	2.10
June	38,000	16,700	24,500	1.66	1.85
July	26,000	12,300	19,300	1.30	1.50
August	23,200	11,300	18,700	1.26	1.45
September	12,600	5,440	9,260	.626	.70
October	25,000	4,980	14,300	.966	1.11
November	12,000	6,290	9,710	.656	.73
December	28,800	6, 290	15, 100	1.02	1.18
The year	101,000	4,980	22, 122	1.49	20.16

MONTHLY DISCHARGE OF SANTEE RIVER AT FERGUSON, S. C .- Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1923					-
January	26,000	10,800	19,500	1.32	1.52
February	41,000	16,500	24,400	1.65	1.72
March	89,000	19,500	39,600	2.68	3.09
April	30,500	19,500	24,500	1.66	1.85
May	25,000	16,500	20,300	1.37	1.58
June	35,000	8,330	19,600	1.32	1.47
July	15,900	7,920	11,600	.784	.90
August	18,600	10,600	14,700	.993	1.14
September	22,800	7,140	14,600	.986	1.10
October	12,200	4,980	7,900	.534	.62
November	15,300	5,820	9,000	.608	.68
December	23,400	8,750	17,100	1.16	1.34
The year	89,000	4,980	18,567	1.25	17.01

CATAWBA RIVER AT OLD FORT, N. C.

LOCATION. At wooden wagon bridge, one-fourth mile above the mouth of Mill Creek and half a mile south of Old Fort, McDowell County.

Drainage Area. 14.7 square miles.

Records Available. May 24 to December 31, 1907 when station was discontinuable.

GAGE. Vertical rod gage fastened to bridge bent.

DISCHARGE MEASUREMENTS. Made from bridge to which gage is attached.
CHANNEL AND CONTROL. Bed is sand and liable to shift. Control not known.
EXTREMES OF DISCHARGE. Maximum stage recorded, 2.4 feet June 1 and 4, 1907 (discharge not determined); minimum stage recorded, 0.80 foot December 12 and 13, 1907 (discharge not determined).

ICE. Stage-discharge relation seldom if ever affected by ice.

REGULATION. None.
ACCURACY. Stage-discharge relation fairly permanent. Daily discharge based on an approximate rating curve. Gage read to tenths by W. A. Thomas.

DAILY DISCHARGE IN SECOND-FEET OF CATAWBA RIVER AT OLD FORT, N. C., FOR 1907

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
		1		1								
1							27	27	13	19	19	19
2							19	27	13	19	19	36
3							19	27	13	19	19	19
4							19	27	13	19	19	19
5							19	27	13	19	19	19
6							19	27	13	19	19	19
7							19	36	60	19	19	13
8							19	27	51	19	19	13
9							19	27	51	19	19	13
10							19	27	46	19	19	13
11							19	19	46	19	19	13
12						51	27	19	36	19	19	8
13						51	27	19	19	19	19	8
14						51	19	19	19	19	19	36
15							27	27	19	19	19	
16						46	51	27	19	19	19	6.0
17						36	36	36	19	19	19	51
18						27	36	36	19	19	19	36
19						27	27	27	19	19	19	27
20						27	27	27	19	19	19	27
21						27	27	19	19	13	36	27
22						27	19	19	19	13	27	27
23						27	19	19		13	19	27
24					19	36	19	19		13	60	19
25					27	27	36	13	19	13	51	19
26					27	27	27	13	19	46	46	19
27					36	27	27	13	19	46	36	19
28					46	27	19	13		36	27	
29					46	2.7	19	13	36	36	19	
30				-	36	27	27	13	19	36	19	
31					36		27	13		27		
										-		

Note. Daily discharge based on an approximate rating curve. Beginning May 24, the discharge for all missing days was greater than 50 second-feet.

CATAWBA RIVER NEAR MORGANTON, N. C.

Location. At highway bridge on road from Morganton to Hartland, 200 yards below mouth of Upper Creek and 1 mile north of Morganton, Burke County.

Drainage Area. 758 square miles.

Records Available. May 6, 1903 to June 30, 1906; January 16 to December 21, 1907; January 1, 1908 to June 30, 1909, when station was discontinued.

Gage. Chain gage attached to downstream side of steel highway bridge; read by

Oscar A. Gillam.

DISCHARGE MEASUREMENTS. Made from bridge to which gage is attached.
CHANNEL AND CONTROL. Bed of stream is rock with sand and gravel near right bank; fairly permanent. Current swift; control not known. Left bank is high, rocky and wooded and is not subject to overflow; right bank is low and is sometimes overflowed. Channel straight for 200 feet above and 600 feet below bridge.

Extremes of Discharge. Maximum stage recorded, 16.3 feet May 21, 1909 (discharge not determined); minimum stage recorded, 0.85 foot October 17, 1904 (discharge not determined).

Ice. Stage-discharge relation seldom if ever affected by ice.

REGULATION. Low water flow somewhat affected by operation of mills above. Accuracy. Stage-discharge relation fairly permanent. Rating curves are approximate owing to inadequate data. Gage read once daily to half tenths.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF CATAWBA RIVER NEAR MORGANTON, N. C.

	Year								
Week	1903	1904	1905	1906	1907	1908	1909		
1		584	925	2,609		1,804	3,280		
2		539	3,459	1,941		5,751	1,744		
3		504	1,095	1,866		1,857	2,293		
4		946	634	6,917	1,146	1,147	1,386		
5		614	604	2,956	1,189	1,005	1,077		
6		827	735	1,767	1,197	1,249	1,580		
7		672	1,299	1,574	1,043	6,397	2,044		
9		1,330	3,269 1,613	1,514 1,377	1,054 1,609	2,089	3,467		
10		1,033 4,239	1,369	1,636	1,583	1,958 1,677	2,831 2,099		
11		1,069	1,209	2,117	1,429	1,540	2,099		
12		1,003	1,200	1,964	1,103	2,497	2,406		
13		1,046		2,234	1,124	2,467	2,431		
14		759		1,786	950	1,317	1,266		
15		1,159	1,240	1,449	993	1,267	2,040		
16		731	892	2,039	1,064	1,429	2,503		
17		762	790	1,334	1,780	1,851	2,056		
18		1,635	1,288	1,506	1,429	1,817	1,124		
19	1,369	2,819	2,051	1,300	1,206	1,541	2,673		
20	1,314	1,578	4,303	1,065	949	1,370	2,949		
21	1,109	895	2,018	971	913	1,611	11,043		
22	2,510	3,245	1,018	903	3,970	1,369	2,159		
23	6,788	1,249	643	1,470	1,847	1,446	9,369		
24	3,097	829	1,919	5,900	1,489	1,257	2,560		
25	2,058	939	2,658	2,644	1,099	1,231	1,756		
27	1,365 1,279	1,131 737	914 . 1,705		1,369 926	1,046 2,786			
28	1,279	613	8,136		2,136	1,543			
29	1,005	459	2,420		979	1,257			
30	787	948	1,838		748	1,180			
31	1,310	1,539	926		643	1,274			
32	740	1,748	3,839		589	2,087			
33	1,545	824	1,514		760	1,823			
34	971	1,173	966		782	9,076			
35	607	959	3,391		510	4,699			
36	761	559	814		499	3,540			
37	752	426	621		991	2,870			
38	966	389	601		2,726	2,126			
39	594	341	516		1,296	1,193			
40	608	1,043	488		704	820			
41	1,098	349	1,212		595	1,547			
42	698	312	571		521 548	2,337			
43	619 532	330			594	11,677 8,678			
45	749	481			559	5,066			
46	784	511 658	471		584	1,543			
47	667	409	494		1,811	1,171			
48	538	437	465		931	1,051			
49	526	866	2,536		1,053	1,206			
50	551	565	1,520		2,707	1,317			
51	649	493	2,755			1,769			
52	601	829	1,189			1,712			

Monthly Discharge of Catawba River Near Morganton, N. C. [Drainage area, 758 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1903					
May 6-31	1,925	1,026	1,283	1.69	1.63
June	17,040	1,156	3,476	4.59	5.12
July	2,220	702	1,100	1.45	1.67
August	2,902	367	1,028	1.36	1.57
September	1,735	569	770	1.02	1.14
October	3,390	526	735	.97	1.12
November	1,830	526	674	.89	.99
December	908	485	579	.76	.88
1904					
January	2,220	487	643	0.848	0.978
February	3,000	569	915	1.21	1.30
March	15,480	800	1,759	2.32	2.68
April	2,708	657	846	1.12	1.25
May	7,777	657	1,878	2.48	2.86
June	6,217	612	1,333	1.76	1.96
July	2,220	410	711	.938	1.08
August	3,585	612	1,293	1.71	1.97
September	1,830	339	639	.843	• .940
October	447	280	338	.446	.51
November	1,156	372	515	.679	.758
December	1,550	410	679	.896	1.0
The year	15,480	280	962	1.27	17.32
1905	11 500	470	1 490	1.00	0.10
January	11,580	470	1,438	1.90 2.13	2.19 2.22
February	4,950 1,930	550 840	1,616	1.60	1.43
March 1-24	1,572	740	1,212 964	1.00	1.45
April 9-30	6,900	690	2,311	3.05	3.52
June	8,460	470	1,474	1.94	2.16
July		950	3,290	4.34	5.00
August	9,630	740	2,259	2.98	3.44
September	1,415	470	670	.884	.98
October 1-26	4,170	435	710	.937	.90
November	550	435	476	.628	.56
December	6,900	470	1,875	2.47	2.85
1906 January	24,200	1,000	3,360	4.43	5.11
February	3,080	1,360	1,730	2.28	2.37
March	4,550	1,180	1,870	2.47	2.85
April.	2,810	1,180	1,680	2.22	2.48
May	1,780	790	1,180	1.56	1.80
June	16,100	740	2,680	3.54	3.95
1907 January 16-31	1,420	1,060	1,200	1.58	0.94
February	1,480	950	1,150	1.52	1.58
March	2,680	950	1,350	1.78	2.05
April	2,680	895	1,210	1.60	1.78
May	1,600	790	1,090	1.44	1.66
June	14,500	950	2,120	2.80	3.12
July	6,680	690	1,170	1.54	1.78
August	1,300	470	664	.876	1.01
September	16,400	435	1,320	1.74	1.94
October.	790	510	585	.772	.89
November	4,400	510	942	1.24	1.38
December	7,700	690	1,670	2.20	1.72

MONTHLY DISCHARGE OF CATAWBA RIVER NEAR MORGANTON, N. C.—Continued

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1908					
January	17,100	895	2,480	3.27	3.77
February	21,400	950	2,770	3.65	3.94
March.	3,950	1,300	2,050	2.70	3.11
April	3,360	950	1,480	1.95	2.18
May	3,430	1,000	1,540	2.03	2.34
June	1,480	840	1,250	1.65	1.84
July	4,100	1,060	1,650	2.18	2.51
August	28,400	1,180	3,950	5.21	6.01
September	3,950	840	2,530	3.34	3.73
October	15,400	740	4,710	6.21	7.16
November	7,700	1,000	2,960	3.91	4.36
December	3,950	1,000	1,480	1.95	2.25
The year	28,400	740	2,400	3.17	43.20
	7,490	1,060	2.070	2.73	3.15
JanuaryFebruary	4,870	950	2,070	2.15	2.98
March	6,880	1.540	2,170	3.21	3.70
April	4,100	840	1,930	2.55	2.84
May	32,200	895	4,310	5.69	6.56
June	26,400	1,180	3,600	4.75	5.30
J UHC	20,400	1,180	3,000	4.10	0.00

CATAWBA RIVER AT RHODHISS, N. C.

LOCATION. At new highway bridge, 1,000 feet below dam of Rhodhiss Manufacturing Co., 1 mile from Carolina and North Western Railroad station in Rhodhiss, Caldwell County. The tailrace of the company's cotton mills empties into river 300 feet upstream from gage.

Drainage Area. 1,180 square miles (determined by Rhodhiss Manufacturing Co.). Records Available. April 13, 1917 to March 31, 1920, when station was discontinued.

GAGE. Chain gage attached to upstream side of highway bridge; read by H. C. Cobb and A. C. Holbar.

DISCHARGE MEASUREMENTS. Made from the bridge.
CHANNEL AND CONTROL. Bed composed of rock; probably permanent.
EXTREMES OF DISCHARGE. 1917-1920: Maximum stage recorded, 19.2 feet at
2 a.m. October 26, 1920 (discharge, 52,900 second-feet); minimum stage, 0.2 foot at 6 p.m. November 16, 17 and December 6, 1919 (discharge estimated, 100 second-feet) undoubtedly owing to shut-down at plant above gage.

ICE. Stage-discharge relation not affected by ice.

REGULATION. Slight fluctuations at low stages caused by operation of power plant of the Rhodhiss Manufacturing Co.

Accuracy. Stage-discharge relation shifted once during record. Rating curves fairly well defined between 700 and 1,300 second-feet and well defined between 1,300 and 10,000 second-feet; extended above 10,000 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except those below 1,000 second-feet which are subject to error owing to regulation caused by operation of power plant, and those above 10,000 second-feet, which are fair.

Mean Weekly Discharge, in Second-feet, of Catawba River at Rhodhiss, N. C.

	Year							
Week	1917	1913	1919	1920				
1		1,078	5,717	1,2				
		2,226	2,914	1,8				
3		1,756	2,127	1,70				
4		2,136	3,287	1,6				
5		5,976	2,596	2,1				
		2,226	2,780	1,6				
		1,881	2,510	1,0				
3		1,931	2,794	1,2				
		1,413	3,529	1,0				
			5,671	1,3				
)		1,263						
		1,164	3,409	1,6				
		1,490	2,643	1,0				
3		1,301	3,186					
		1,607	2,289					
5		3,211	3,083					
3	1,783	2,406	2,220					
7	1,692	2,009	2,017					
3	1,639	1,574	2,749					
9	1,510	1,417	4,277					
)	1,304	1,827	3,740					
	1,324	2,150	3,686					
2	1,244	1,469	2,320					
3	1,376	1,287	2,351					
4	1,309	1,078	1,657					
5	1,110	1,740	2,773					
3	1,016	1,973	5,086					
7	1,229	1,399	2,341					
8	1,266	989	1,974					
9	2,170	934	9,204					
)	3,263	1,506	4,663					
1	1,533	1,741	1,957					
2	1,249	1,549	2,380					
3	870	1,460	2,243					
1	1,001	1,124	1,164					
5	3,222	1,038	1,357					
3	1,606	1,050	1,080					
7	1,019	917	1,054					
3	1,071	1,309	910					
9	1,324	999	1,197					
)	988	764	1,467					
	898	756	1,194					
2	1,604	1,079	887					
3	1,067	11,224	1,326					
1	1,263	11,331	1,713					
5	965	2,357	1,111					
3	1,030	2,923	999					
7	937	2,649	1,509					
8	877	2,363	1,740					
)	838	1,620	1,350					
0	854	2,661	2,253					
1	1,014	10,866	921					
2	985	5,802	758					
	989	9,002	190					

MONTHLY DISCHARGE OF CATAWBA RIVER AT RHODHISS, N. C. [Drainage area, 1,180 square miles]

		Discharges in	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1917					
May	1,770	1,050	1,410	1.19	1.3
June	2,290	950	1,210	1.03	1.13
July	6,100	900	1,920	1.63	1.8
August	1,940	778	1,130	.958	1.0
September	15,400	900	1,770	1.50	1.6
October	4,350	778	1,180	1.00	1.1
November	1,210	815	974	.825	.9
December	1,270	600	921	.781	.90
1918 January	9,160	858	2,460	2.08	2.4
February	4,830	1,400	2,230	1.89	1.9
March.	2,110	1,100	1,320	1.12	1.2
April	7,980	1,000	2,250	1.91	2.1
May	2,840	1,210	1,730	1.47	1.7
June	2,880	900	1,390	1.18	1.3
July	4,590	815	1,400	1.19	1.3
August	3,230	900	1,340	1.14	1.3
September	1,770	815	1,060	.889	1.0
October	39,800	685	4,970	4.21	4.8
November	8,000	1,630	2,980	2.53	2.8
December	22,200	1,220	5,070	4.30	4.9
The year	39,800	685	2,350	1.99	27.1
1919					
January	12,400	1,630	3,450	2.92	3.3
February	4,280	1,780	2,480	2.10	2.1
March	12,100	2,240	3,740	3.17	3.6
April	5,040	1,930	2,420	2.05	2.0
May	6,080	2,400	3,500	2.97	3.4
June	9,400	1,220	2,880	2.44	2.7
July	20,600	1,630	4,340	3.68	4.2
August	7,440	1,090	1,820	1.54	1.7
September	1,630	630	1,080	.915	1.0
October	2,080	740	1,250	1.06	1.2
November	2,760	100	1,380	1.17	1.3
December	6,600	100	1,340	1.14	1.3
The year	20,600	100	2,473	2.10	28.3
1920		05:	4 0/-	1.00	
January	2,080	630	1,610	1.36	1.5
February	6,080	850	1,430	1.21	1.30
March	8,280	970	1,750	1.48	1.71

CATAWBA RIVER AT CATAWBA, N. C.

- LOCATION. At Southern Railway bridge just below mouth of Lyle Creek and about half a mile from Catawba, Catawba County.
- Drainage Area. 1,535 square miles. Records Available. July 4, 1896 to December 31, 1899; June 13, 1900 to March
- 31, 1902, when station was discontinued.

 31, 1902, when station was discontinued.

 Gage. Wire gage fastened to footway; read by C. A. Reed. Datum unchanged. Discharge Measurements. Made from plank walk underneath bridge.

 Channel and Control. Bed sandy; current swift and evenly distributed across stream. Channel straight above and below bridge. Control not known. Left bank high; right bank subject to overflow at very high stages.

 Extremes of Discharge. Maximum stage recorded, 29.0 feet May 22, 1901 (discharge 81 500 second-feet;) minimum stage recorded, 145 feet Sentember 4.
- (discharge, 81,500 second-feet;) minimum stage recorded, 1.45 feet September 4 1896 (discharge, 740 second-feet.)
- ICE. Stage-discharge relation not affected by ice.
- REGULATION. Probably negligible.

 Accuracy. Stage-discharge relation shifts frequently. Rating curves poorly, defined. Records poor.

Mean Weekly Discharge, in Second-feet, of Catawba River at Catawba, N. C.

XX1-		Year						
Week	1896	1897	1898	1899	1900	1901		
1		1,191	1,373	5,921		3,349		
2		1,199	1,414	5,503		6,087		
3		2,065	1,668	3,507		3,323		
4		2,175	3,930	2,529		2,804		
5		2,594	1,816	5,368		2,947		
6		12,361	1,425	13,456		3,114		
7		4,587	1,393	5,893		3,029		
8		7,853	1,382	4,487		2,887		
9		2,324	1,330	10,725		2,877		
10		8,334	1,280	7,586		3,140		
11		9,676	1,343	15,416		3,237		
12		4,529	1,436	22,515		3,266		
13		2,306	5,767	9,851		11,971		
14		12,364	2,501	8,639		10,331		
15		3,499	1,618	6,879		4,609		
16		2,393	1,800	4,345		1,002		
17		2,393	1,682	4,861				
18		4,966	1,704	3,911		3,598		
19		2,695	1,704	6,287		3,429		
20		2,093	1,704	3,659		4,329		
21								
22		1,619	1,870	2,771		22,109		
A CONTRACTOR OF THE PARTY OF TH		1,441	1,290	2,481		5,224		
23		2,429	1,120	2,655		3,828		
24		1,681	1,569	3,186		9,176		
25		1,554	1,460	2,217		5,525		
26		1,301	1,150	1,891		3,265		
27		1,632	1,592	1,846		2,740		
28	9,929	1,736	4,107	1,743		3,34		
29	2,139	1,787	3,610	1,530		3,96		
30	1,737	2,076	4,193	2,421		3,714		
31	1,407	1,498	6,126	1,571		2,718		
32	1,130	1,929	6,334	1,903		10,87		
33	1,121	1,184	4,334	1,370		17,01		
34	889	1,007	3,541	1,289		9,59		
35	902	950	3,779	2,306		8,064		
36	1,296	936	6,759	1,844		3,630		
37	881	950	2,161	1,494		2,96		
38	828	1,026	8,918	1,561		3,59		
39	1,383	1,177	9,794	1,244		3,139		
40	1,066	850	12,498	1,229		3,09		
41	818	4,159	4,821	1,591		2,729		
42	789	1,427	5,393	1,372		2,366		
43	789	1,051	7,854	1,381		2,341		
44	899	1,421	3,194	1,383		2,315		
45	3,996	1,061	2,336	1,470		2,380		
46	1,049	950	2,578	1,381		2.199		
47	1,049	950	3,158	1,289		2,47		
48	5,571	1,731	2,476	1,382		2,13		
49	1,723	1,246	4,864	1,440		2,334		
50	2,041	1,129	2,458	5,095		7,589		
51	1,824	1,415	2,566	2,056		3,276		
52	1,101	1,479	3,021	3,442		10,508		

Monthly Discharge of Catawba River at Catawba, N. C. [Drainage area, 1,535 square miles]

		Discharges in Second-feet				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1896						
uly 4-31	*16,100	1,420	4,466	2.91	3.0	
ugust	1,420	770	1,071	.698	.8	
eptember		770	1,090	.710		
ctober	1,630	770	865	.564	.6	
Tovember	*15,200	835	2,222	1.45	1.6	
Pecember	9,800	1,060	2,149	1.40	1.6	
anuary	6,452	1,050	1,647	1.07	1.2	
ebruary	40,230	1,550	7,006	4.56	4.3	
larch	17,663	1,550	5,637	3.67	4.5	
pril	40,525	2,180	5,014	3.27	3.6	
[ay	11,025	1,435	2,600	1.69	1.5	
une		1,270	1,833	1.19	1.3	
uly		1,270	1,774	1.16	1.5	
ugust		950	1,321	.861		
eptember		900	1,017	.663		
ctober		850	1,787	1.16	1.	
Vovember		950 1,105	1,233 1,328	.803	1.	
The year	40,525	850	2,683	1.75	23.	
1898	700	4.000	0.100	1.07		
anuary	,700	1,280	2,103	1.37	1.	
ebruary		1,350	1,417 2,270	.923	1.	
pril		1,280 1,575	1,949	1.48 1.27	1.	
lay		1,373	1,600	1.04	1.	
une		1,000	1,322	.861		
uly		1,140	3,321	2.16	2.	
ugust		2,100	5,042	3.28	3.	
eptember		1,500	6,620	4.31	4.	
ctober		2,675	7,250	4.72	5.	
ovember		1,875	2,691	1.75	1.	
ecember		2,175	3,162	2.06	2.	
The year	52,600	1,000	3,245	2.11	28.	
anuary	17,075	2,400	4,175	2.72	3.	
ebruary	32,710	2,400	8,776	5.72	5.	
[arch		4,135	13,127	8.55	9.	
pril		3,900	6,172	4.02	4.4	
[ay		2,600	3,933	2.56	2.9	
une		1,270	2,492	1.62	1.8	
uly		1,470	1,873	1.22	1.4	
ugust		1,270	1,645	1.07	1.5	
eptember	2,800	1,210	1,588	1.03	1.1	
ctober	1,760	1,150	1,386	.903	1.0	
Ovember	1,540	1,270 1,400	1,384 2,921	1.90	1.0	
The year		1,150	4,098	2.67	36.:	

^{*}Estimated.

MONTHLY DISCHARGE OF CATAWBA RIVER AT CATAWBA, N. C .- Continued

		Discharges in Second-feet					
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches		
1001							
1901 January	17,240	2,720	3,777	2.46	2.84		
February.	4,175	2,720	3,009	1.96	2.04		
March	38,375	2,855	5,130	3.34	3.85		
April 1-20	30,010	2,000	9,911	6.46	4.80		
May	79,625	3,150	8,260	5.38	6.20		
June	24,540	2,810	5,358	3.49	3.89		
July	6,655	2,275	3,383	2.20	2.54		
August	40,250	2,450	10,326	6.73	7.76		
September	6,590	2,495	3,493	2.28	2.54		
October	4,450	2,315	2,601	1.69	1.95		
November	3,500	2,000	2,311	1.51	1.69		
December	45,875	2,090	5,830	3.80	4.38		
	10,010	2,000	0,000	0.00			

CATAWBA RIVER NEAR ROCK HILL, S. C.

LOCATION. At Southern Railway bridge, 3 miles south of Fort Mill, 4½ miles northeast of Rock Hill, York County and 5 miles above mouth of Sugar Creek.

Drainage Area. 3,050 square miles.

RECORDS AVAILABLE. September 23, 1895 to July 31, 1903, when station was discontinued.

GAGE. Wire gage fastened to guard rail on upper side of bridge, read by D. A. Morris. DISCHARGE MEASUREMENTS. Made from bridge.

CHANNEL AND CONTROL. Bottom of stream rough. Water shallow at ordinary stages. Current at angle with bridge and is swift. Channel curved above and below bridge. Control not known.

EXTREMES OF DISCHARGE. Maximum stage recorded, 24.15 feet at 10 a.m. May 23, 1901 (discharge, 151,000 second-feet); minimum stage recorded, 1.5 feet numerous days in September, October, and November 1895, and August, September, and October 1896 (discharge, 1,200 second-feet).

ICE. Stage-discharge relation not affected by ice.

REGULATION. Diurnal regulation probable.

ACCURACY. Stage-discharge relation changes for low water frequently. Rating curves poorly defined except for the periods October 3, 1899 to October 25, 1900, and from March 28, 1901 to May 23, 1901, which are fairly well defined throughout. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records poor except for the periods mentioned above which are fair.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF CATAWBA RIVER NEAR ROCK HILL, S. C.

	Year									
Week	1895	1896	1897	1898	1899	1900	1901	1902	1903	
		3,016	1,660	3,031	7,973	3,251	6,146	9,994	14,85	
		1,883	1,604	2,970	9,967	4,857	9,967	5,609	5,62	
		2,244	2,479	3,000	6,183	4,173	6,441	5,009	4,56	
		5,199	3,449	5,609	4,667	4,001	5,093	5,627	4,81	
		4, 267	3,050	3,899	4,600	2,887	5,589	12,360	4,8	
5		12,096	23,243	3,150	27,614	3,966	6,021	6,246	16,2	
		3,969	6,186	3,030	10,719	17,079	5,490	5,419	19,0	
3		2,639	8,827	2,970	9,314	7,540	4,899	8,844	7,8	
		2,490	4,834	2,821	16,386	15,647	4,550	30,057	12,2	
)		2,054	13,057	3,097	10,057	6,836	4,477	8,231	8,6	
		2,114	14,786	2,970	25,616	9,526	5,540	7,741	9,1	
	_	2,171	7,143	3,764	31,343	6,200	4,666	6,854	33,1	
B		2,233	4,304	6,976	13,971	5,830	20,377	12,640	18,7	
		5,261	19,614	5,786	11,471	4,026	23,336	6,936	9,7	
5		2.143	5,851	3,693	11,986	3,946	5,231	5,816	23,2	
		1,826	4,349	3,061	7,829	11,521	17,191	5,200	9,5	
7		1,713	3,666	3,473	8,143	11,000	7,431	5,020	6,7	
		3,987	5,484	2,820	6,889	4,657	4,653	4,530	5,6	
)		2,121	3,666	2,914	7,801	3,580	4,363	4,290	5,2	
,		1,577	4,579	2,646	7,790	4,483	3,803	4,704	4,9	
		1,811	3,137	3,077	6,054	4,471	30,491	4,987	4,4	
		1,759	2,853	2,620	5,690	3,589	12,177	4,160	5,2	
3		2,929	5,266	2,004	5,370	3,653	6,746	3,854	14,2	
1		1,474	3,420	2,650	3,864	4,246	13,183	16,930	7,9	
5		1,946	2,803	3,846	1,200	12,951	13,371	8,136	5,8	
5		2,029	2,410	2,279	1,463	7,823	8,749	4,393	5,2	
		7,461	2,400	2,570	1,154	4,136	6,741	3,754	4,8	
3		31,016	3,374	3,037	1,291	3,049	9,244	4,710	4,3	
)		3,674	6,603	4,980	1,273	2,793	6,554	3,789	3,8	
)		2,671	3,044	4,630	1,821	3,596	4,121	3,721	3,4	
1		2,179	2,020	4,300	1,716	3,146	4,089	3,886	0,1	
2		1,744	4,486	6,686	1,769	2,243	23,221	3,309		
3		2,000	2,381	4,984	1,666	2,339	37,657	6,159		
1		1,449	2,357	10,174	1,360	2,257	19,186	3,120		
5		1,273	1,914	6,180	2,453	2,391	19,457	2,940		
6		2,271	1,707	10,100	2,620	2,129	7,443	4,579		
7		1,507	1,484	10,100	2,360	1,791	5,877	5,716		
8		1,346	1,560	10,100	1,940	3,410	9,421	2,940		
9	1,249	2,351	1,787	7,566	1,791	1,409	6,793	2,970		
0	1,200	2,653	1,460	18,717	1,876	1,611	7,356	4,636		
1	1,224	1,224	3,651	7,514	2,500	1,959	4,913	4,204		
2	1,200	1,273	2,830	6,486	2,100	1,633	5,344	3,416		
3	1,200	1,321	3,080	12,063	1,957	13,193	4,290	3,889		
4	1,324	1,399	2,801	5,501	2,280	5,251	4,290	3,989		
5	1,823	5,230	2,820	5,281	1,986	5,356	4,290	3,636		
6	1,903	2,340	2,530	5,309	1,873	4,030	4,221	5, 191		
7	1,370	1,631	2,530	6,231	1,877	4,030	4,256	4,037		
8	1,664	4,406	3,926	5,421	2,187	8,049	4,121	5,331		
9	1,447	3,226	3,307	7,456	1,900	7,803	4,294	9,131		
0	1,579	2,480	2,970	5,203	4,164	4,940	14,523	4,496		
1	2,744	3,066	3,373	5,557	2,920	7,260	6,937	6.204		
2	2,635	1,765	3,766	6,745	3,561	6,302	31,806	4,700		

Monthly Discharge of Catawba River Near Rock Hill, S. C. [Drainage area, 3,050 square miles]

	*	Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1895					
October	1,370	1,200	1.210	0.397	0.46
November	2,350	1,200	1,660	.544	.61
December	6,300	1,370	2,180	.715	.82
1896					
January	9,260	1,740	3,050	1.00	1.15
February	18,000	2,350	5,600	1.84	1.98
March	2,800	1,940	2,180	.715	.82
April	14,400	1,550	2,680	.879	.98
May	8,580	1,370	2,310	.757	.87
June	5,110	1,200	2,090	.685	.76
July	71,500	1,370	10,300	3.38	3.90
August	2,350	1,200	1,710	.561	.65
September		1,200	1,820	.597	.67
October		1,200	1,580	.518	.60
November	12,700	1,370	2,650	.869	.97
December	13,100	1,740	3,140	1.03	1.19
The year	71,500	1,200	3,259	1.07	14.54
1897	0.010	4 770	2 240	0.70	0.00
January	6,610	1,550	2,240	0.734	0.85
February	68,500	1,740	10,800	3.54 3.04	3.69
March	24,100	3,700 3,460	9,260 8,070	2.65	2.96
May	57,800 9,910	2,790	4,060	1.33	1.53
June	9,570	2,180	3,450	1.13	1.20
July	12,800	1,990	3,130	1.03	1.19
August	11,000	1,810	2,720	.892	1.03
September	2,180	1,460	1,650	.541	.60
October	11,300	1.460	2,730	.895	1.03
November	5,530	2,530	2,940	.964	1.08
December	4,290	2,940	3,350	1.10	1.27
The year	68,500	1,460	4,533	1.49	19.99
January	9,300	2,940	3,730	1.22	1.41
February	3,820	2,730	3,080	1.01	1.05
March	19,100	2,730	3,820	1.01	1.44
April	10,700	2,730	4,190	1.37	1.53
May	4,530	2,140	2,850	.934	1.08
June	7,210	1,770	2,680	.879	.98
July	9,650	1,770	3,890	1.28	1.48
August	23,200	3,370	6,470	2.12	2.44
September	10,100	3,590	9,290	3.05	3.40
October	38,000	4,530	10,700	3.51	4.05
November	6,630	5,020	5,520	1.81	2.02
December	12,400	4,530	6,200	2.03	2.34
The year	38,000	1,770	5,202	1.71	23 .22

MONTHLY DISCHARGE OF CATAWBA RIVER NEAR ROCK HILL, S. C.-Continued

		Discharges in	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inche
1899			100		
anuary	27,100	4,290	6,930	2.27	2.
ebruary	47,000	4,530	14,900	4.89	5.
farch	85,400	6,510	19,500	6.39	7.
pril	22,800	7,100	9,810	3.22	3.
lay	11,900	5,650	6,950	2.28	2.
une	6,220	1,200	3,280	1.08	1.
aly	3,180	1,040	1,420	.466	
ugust	2,730	1,200	1,650	.541	
eptember	5,800	1,530	2,300	.754	
ctober	3,650	1,710	2,100	.689	
ovember	2,950	1,710	2.040	.669	
ecember	7,020	1,900	3,080	1.01	1
The year	85,400	1,040	6,163	2.02	27
1900 nuary	10,800	2,300	3,960	1.30	1
ebruary	50,800	2,730	8,120	2.66	2
arch	48,200	3,410	9,250	3.03	3
pril	36,200	3,180	7,700	* 2.52	2
ay	10,400	3,180	4,010	1.31	1
ine	19,500	3,180	6,850	2.25	2
ıly	5,240	2,510	3,500	1.15	1
ugust	3,410	1,900	2,450	.803	
eptember	5,800	1,360	2,130	.698	
ctober	44,400	1,530	4,630	1.52	1
ovember	19,200	4,030	5,400	1.77	1
ecember	11,600	4,290	6,470	2.12	2
The year	50,800	1,360	5,372	1.76	23
nuary	30,500	4,820	6,710	2.20	2
ebruary	10,200	4,550	5,470	1.79	1
arch	61,400	4,290	8,330	2.73	3
pril	107,000	3,900	16,000	5.25	5
ay	127,000	3,180	15,400	5.05	5
ine	31,700	5,020	10,100	3.31	3
ıly	21,800	3,820	6,670	2.19	2
ugust	66,200	3,820	22,200	7.28	8.
eptember	16,200	5,270	7,890	2.59	2.
ctober	9,650	4,290	5,360	1.76	2.
ovember	4,770	4,050	4,260	1.40	1.
ecember	98,600	3,820	14,300	4.69	5.
The year	127,000	3,180	10,224	3.55	45.

MONTHLY DISCHARGE OF CATAWBA RIVER NEAR ROCK HILL, S. C .- Continued

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1902					
January	23,200	5,020	6,530	2.14	2.47
February	30,600	5,020	9,610	3.15	3.28
March		5,530	12,600	4.13	4.76
April.		4,530	5,830	1.91	2.13
May	5,530	3,820	4,600	1.51	1.74
June	81,000	3,590	8,010	2.63	2.93
July		3,590	4,000	1.31	1.51
August		2,940	3,940	1.29	1.49
September		2,940	3,980	1.30	1.45
October	8,700	2,940	4,130	1.35	1.56
November	17,000	3,150	4,140	1.36	1.52
December	15,000	4,050	6,210	2.04	2.35
The year.	81,000	2,940	6,132	2.01	27.19
1903	00.000	4.050	- 240	0.05	2.73
January	36,200	4,050	7,240	2.37	4.13
February	37,400	4,290	12,100	3.97 5.61	6.47
	93,800 37,400	5,530 5,800	17,100 12,600	4.13	4.61
April	5,800	4,290	4,960	1.63	1.88
June	38,600	4,290	8,230	2.70	3.01
July	6,350	3,370	4,200	1.38	1.59

MILL CREEK AT OLD FORT, N. C.

LOCATION. At the footbridge in Old Fort, McDowell County, a short distance above the mouth of creek.

Drainage Area. 21.2 square miles.

Records Available: May 24 to December 31, 1907, when station was discon-

Gage. Vertical staff attached to sycamore tree on left bank about 500 feet above footbridge; read by W. A. Thomas.

DISCHARGE MEASUREMENTS. Made from footbridge.

CHANNEL AND CONTROL. Bed of stream, gravel; probably shifting. Control section not known. Right bank high; left bank subject to overflow.

EXTREMES OF DISCHARGE. Maximum stage recorded, 2.6 feet May 31, June 1, and December 28, 1907 (discharge not determined); minimum stage recorded, 1.0 foot September 13 to 21 and 27, 1907 (discharge, 5 second-feet).

ICE. Stage-discharge relation not affected by ice.

Accuracy. Stage-discharge relation shifting. Rating curve poorly defined.

Gage read to tenths once daily.

Gaily gage height to rating table. Records poor.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF MILL CREEK AT OLD FORT, N. C.

Week	1907	Week	1907	Week	1907
22	22	33	. 26	43	3
3	48	34	21	44	38
4	47	35	10	45	35
5	46	36	15	46	38
6	44	37	6	47	5-
7	41	38	31	48	4
8	20	39	32	49	30
9	28	40	29	50	47
0	34	41	25	51	39
1	34	42	20	52	75
2	26				

LINVILLE RIVER AT BRANCH, N. C.

- LOCATION. At wooden highway bridge 800 feet from Branch postoffice, Burke County, a quarter mile upstream from Lake James, 2 miles below mouth of

- County, a quarter mile upstream from Lake James, 2 miles below mouth of Linville Gorge and about 12 miles from Nebo.

 Drainage Area. 65 square miles (measured on topographic maps).

 Records Available. June 7, 1922 to December 31, 1923.

 Gage. Standard enameled vertical staff on downstream end of first bridge pier from right bank; read by J. M. Wall.

 Discharge Measurements. Made from downstream side of bridge.

 Channel and Control. Wide and shallow, composed of gravel and boulders; slightly curved above bridge and straight for 200 feet below. Right bank high and wooded, not subject to overflow; left bank about 6 feet high, partially wooded and partially cultivated; subject to overflow in extreme floods for 500 feet back from stream. Control is a boulder and gravel shoal 200 feet downfeet back from stream. Control is a boulder and gravel shoal 200 feet down-
- stream from gage; probably permanent.

 Extremes of Discharge. 1922-1923: Maximum stage recorded, 5.4 feet at noon, May 29, 1923 (discharge, 2,830 second-feet); minimum stage recorded, 1.54 feet at 5 p.m., October 6, 1922, and October 16 to 18, 1923 (discharge, 29 secondfeet).
- Ice. Stage-discharge relation not affected by ice.
- ACCURACY. Stage-discharge relation permanent. Rating curve is well defined up to 500 second-feet and extended above. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF LINVILLE RIVER AT BRANCH, N. C.

	Y	ear			Year
Week	1922	1923	Week	1922	1923
1		252	27	138	193
2		113	28	108	120
3		83	29	172	196
4		122	30	144	90
5		266	31	89	104
6		204	32	71	111
7		215	33	102	87
8		132	34	70	86
9		118	35	65	84
10		175	36	48	101
11		369	37	54	83
12		279	38	43	82
13		136	39	58	108
14		122	40	38	47
15		153	41	189	37
16		140	42	68	45
		103	43	61	55
18		144	44	47	47
19		167	45	45	96
20		345	46	42	53
		274	47	40	59
22		597	48	41	98
23		180	49	58	180
24	178	116	50	80	106
25	136	. 92	51	149	103
26	102	100	52	100	109

Monthly Discharge of Linville River at Branch, N. C. [Drainage area, 65 square miles]

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1922					
June 7-30	311	. 102	164	2.52	2.25
July	243	. 86	136	2.09	2.41
August	144	54	80.2	1.23	1.42
September	86	39	50.3	.774	.86
October	430	31	85.0	1.31	1.51
November	47	36	42.4	.652	.73
December	264	45	93.6	1.44	1.66
1923					======
January	600	65	155.0	2.38	2.74
February	311	81	189.0	2.91	3.03
March	825	99	227	3.49	4.02
April		91	129	1.98	2.21
May	1,620	81	310	4.77	5.50
June	380	72	144	2.22	2.48
July	380	67	143	2.20	2.54
August	163	63	96.4	1.48	1.71
September	264	54	91.6	1.41	1.57
October	84	29	45.7	.703	.81
November	188	41	68.5	1.05	1.17
December	28)	91	125	1.92	2.21
The year	1,620	29	143.7	2.21	29.99

LINVILLE RIVER NEAR FONTA FLORA, N. C.

LOCATION. At footbridge half a mile east of Fonta Flora, Burke County, and about 6 miles above mouth of river which is a tributary of Catawba River.

6 miles above mouth of river which is a tributary of Catawda River.

Drainage Area, 67 square miles.

Records Available. May 20, 1907 to August 26, 1908; October 6 to December 31, 1908, when station was discontinued.

Gage. Vertical staff in two sections located about 1,200 feet above footbridge; read by W. P. Hemphill.

Discharge Measurements. Made from footbridge.

Channel and Control. Conditions not known.

Extremes of Discharge. Maximum stage recorded, 5.3 feet February 15, 1908

(discharge not determined); minimum stage recorded, 0.75 foot September 4 and 5, 1907 (discharge, 40 second-feet). ICE. Stage-discharge relation not affected by ice.

REGULATION. None.

ACCURACY. Stage-discharge relation fairly permanent. Rating curve fairly well defined between 72 and 190 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF LINVILLE RIVER AT FONTA FLORA, N. C.

	Year			Y	ear
Week	1907	1908	Week	1907	1908
		237	27	127	33
		448	28	263	26
		257	29	215	12
		161	30	112	19
		124	31	91	23
		161	32	72	15
		751	33	82	14
		235	34	98	59
		222	35	59	
		295	36	47	
		211	37	85	
		217	38	241	
		217	39	206	
		178	40	105	
		147	41	69	2
		239	42	66	1
		394	43	52	8
		208	44	70	30
		230	45	96	13
		162	46	98	
	104	156	47	161	10
	96	149	48	138	
	224	138	49	118	14
	152	223	50	331	10
	125	224	51	317	14
	168	159	52	424	11

Monthly Discharge of Linville River at Fonta Flora, N. C. [Drainage area, 67 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907					
May 20-31			101	1.51	0.67
June 4-30	275	96	169	2.52	2.53
July	680	96	173	2.58	2.97
August	156	50	81	1.21	1.40
September	1,390	40	139	2.07	2.31
October	124	50	71	1.06	1.22
November	190	50	118	1.76	1.96
December	940	110	277	4.13	4.76
1908					
January	1,380	124	261	3.90	4.50
February	1,950	124	308	4.60	4.96
March.		156	242	3.61	4.16
April	940	124	239	3.57	3.98
May	275	140	183	2.73	3.15
June	500	124	181	2.70	3.01
July	500	110	237	3.54	4.08
August 1-26		124	277	4.13	4.00
September					
October 6-31		40	384	5.73	5.54
November	370	72	126	1.88	2.10
December	275	72	123	1.84	2.12

LINVILLE RIVER NEAR BRIDGEWATER, N. C.

LOCATION. At Poole's Mill just above the ford on road from Morganton to Marion about 4 miles from Bridgewater, Burke County.

DRAINAGE AREA. 86 square miles.

RECORDS AVAILABLE. July 3 to October 14, 1900, when station was discontinued.

GAGE. Vertical staff near tailrace of mill; read by J. A. Cooper.

DISCHARGE MEASUREMENTS. Made by wading, about 200 feet below gage.

CHANNEL AND CONTROL. Bed extremely rough and rocky; current very swift during high water. Control section not known.

Extremes of Discharge. Maximum stage recorded, 10.33 feet, September 12

and 13, 1900 (discharge not determined); minimum stage recorded, 7.5 feet, September 16, 1900 (discharge not determined).

ICE. Stage-discharge relation not affected by ice. REGULATION. Negligible. ACCURACY. Records fair.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF LINVILLE RIVER NEAR BRIDGEWATER, N. C.

Week	1900	Week	1900	Week	1900
27	215 175 124 123 116	32	86 81 78 74 68	37	203 126 107 188 210

MONTHLY DISCHARGE OF LINVILLE RIVER NEAR BRIDGEWATER, N. C. [Drainage area, 86 square miles]

${f Month}$	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1900 July 3-31	295	90	154	1.79	1.93
August	122	73	85.9	1.00	1.15
September	1,040	59	123	1.43	1.60
October 1-14	255	146	199	2.31	1.20

JOHN RIVER NEAR MORGANTON, N. C.

At high way bridge on road from Morganton, Burke County, to Lenoir, LOCATION. N.C.

Drainage Area. 213 square miles.

RECORDS AVAILABLE. June 19 to August 18, 1900; September 10, 1900 to December 31, 1901, when station was discontinued.

GAGE. Wire gage nailed to guard rail of bridge; read by W. A. Clontz.

DISCHARGE MEASUREMENTS. Made from bridge to which gage is attached. Channel and Control. Bed of stream rocky and permanent. Channel straight for 200 feet above and 300 feet below the station. Control not known. Both

banks high and are never overflowed.

Extremes of Discharge. Maximum stage recorded, 20.5 feet May 22, 1901 (discharge not determined); minimum stage recorded, 1.7 feet September 10 to 13, 1900 (discharge, 80 second-feet).

ICE. Stage-discharge relation not affected by ice.

Accuracy. Stage-discharge relation fairly permanent. Rating curve fairly well defined below 1,500 second-feet; extended above. Gage read to hundredths. Daily discharge ascertained by applying daily gage height to rating table. Records fair for stages below 1,500 second-feet; should be used with caution above.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF JOHN RIVER NEAR MORGANTON, N. C.

	Year		Year		
Week . 1900	1901	Week	1900	1901	
1	370	27	457	76	
	876	28	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		29	319	69	
3	476		279	71	
4	353	30	302	49	
5	370	31	223	97	
6	. 381	32	146	2,31	
7	. 358	33	162	2,49	
8	. 317	34		1,92	
9	. 281	35		1,89	
0	. 382	36		1,02	
1	. 332	37	222	85	
2	409	38	173	71	
3	2,115	39	124	72	
4	1,896	40	248	62	
5	567	41	156	56	
6	2,526	42	118	53	
7	999	43	1,838	45	
8	642	44	370	43	
9	759	45	345	45	
0		46	248	42	
1	3,894	47	337	40	
		48			
	-,		617	36	
		49	596	37	
4	1,758	50	348	2,42	
868	1,989	51	458	89	
26 829	1,112	52	461	2,328	

MONTHLY DISCHARGE OF JOHN RIVER NEAR MORGANTON, N. C. [Drainage area 213 square miles]

		Discharges in Second-feet					
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches		
1900							
June 19-30	1,160	595	872	4.09	1.83		
July	550	233	341	1.60	1.84		
August 1-18	257	140	168	.789	.53		
September 10-30	655	80	173	.812	.63		
October	7,740	95	567	2.66	3.07		
November	1,640	209	390	1.83	2.04		
December	955	281	457	2.15	2.48		
1901							
January	2,300	329	502	2.36	2.72		
February	505	281	352	1.65	1.72		
March	7,080	233	741	3.48	4.01		
April		475	1,450	6.81	7.60		
May	11,200	425	1,490	7.00	8.07		
June	4,280	655	1,420	6.67	7.44		
July		450	783	3.68	4.24		
August		377	1,910	8.97	10.34		
September		535	887	4.16	4.64		
October		425	531	2.49	2.87		
November		329	419	1.97	2.20		
December.	10,300	353	1,460	6.85	7.90		
The year	11,200	233	1,000	4.69	63.75		

JOHN RIVER AT COLLETTSVILLE, N. C.

Location. At footlog a short distance above the mouth of Mulberry Creek in the town of Collettsville, Caldwell County.

Drainage Area, 69 square miles.

Records Available. June 1 to July 31, 1907, when station was discontinued. Gage. Vertical rod attached to footlog supports and to a tree; read by W. T. McLean.

DISCHARGE MEASUREMENTS. Made from the footlog.
CHANNEL AND CONTROL. Conditions not known.
EXTREMES OF DISCHARGE. Maximum stage recorded, 7.5 feet June 1, 1907 (discharge not determined); minimum stage recorded, 1.0 foot May 23 to 25 and 28 to 30, 1907 (discharge, 98 second-feet).

ICE. Stage-discharge relation not affected by ice.

REGULATION. Probably none.

Accuracy. Gage read to tenths once daily. Rating curve very poorly defined. Records poor.

DAILY DISCHARGE, IN SECOND-FEET, OF JOHNS RIVER AT COLLETTSVILLE, N. C., FOR 1907

Day	Jan.	Feb.	Mon	Appil	May	June	Tulve	Aug.	Sont	Oct	Nov	Dog	Mean for Year
Day	Jan.	reb.	mar.	April	may	June	July	Aug.	Sept.	Oct.	INOV.	Dec.	mean for rear
1						1,320	191						
2						540							
						275							
4						203	158						
						172	144						
6						144							
7						131	131						
						119	131						
						238	119						
10						203	119						
11						172	119						
12						144	131						
13						158	144						
14						158	158						
15						144	158						
16						144	172						
17						144	158						
18						131	131						
19						131	158						
20						131	131						
21						144	131						
22						131	119						
23					98	144	119						
24					98	158	144						
25					98	144	131						
26					108	131	119						
27					119	144	119						
					98		119						
30					98		131						
31					98	144	144	100000000000000000000000000000000000000					
31					108		119						
		'											1

THIRD CREEK NEAR STATESVILLE, N. C.

LOCATION. At highway crossing known as McHenry's Bridge, 3 miles above Rowan County line and 6 miles east of Statesville, Iredell County. Drainage Area. 68.9 square miles (measured on topographic maps).

RECORDS AVAILABLE. March 17, 1913 to June 30, 1921.

Gage. Vertical staff located 100 feet upstream from bridge on left bank; read by J. P. Quinn.

DISCHARGE MEASUREMENTS. Made from highway bridge using standard cross-

CHANNEL AND CONTROL. One channel at all stages. Control formed by dredged channel extending to county line; control point probably changes with stage. Both banks subject to overflow at stages above 10 feet.

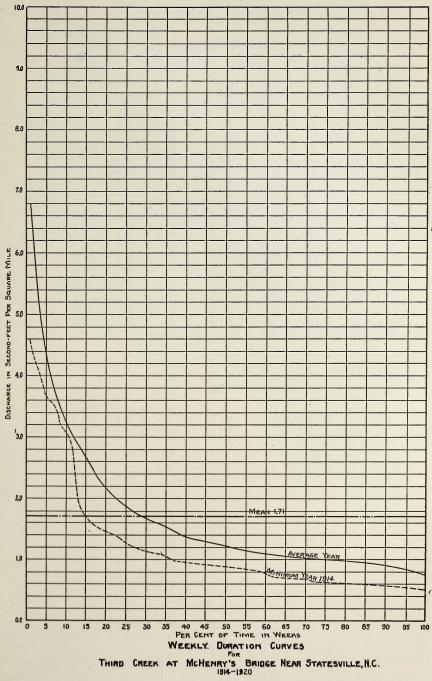
Extremes of Discharge. Maximum discharge recorded, 1,960 second-feet August 31, 1917; minimum discharge, 30 second-feet July 21, 1914.

ICE. Stage-discharge relation probably not affected by ice.
REGULATION. Slight regulation by grist mills above.
Accuracy. Stage-discharge relation shifts: affected by variation in slope with rate of change in stage. Gage read once daily; twice daily on days of wide range in stage. Monthly values fair.

COOPERATION. Data obtained by U. S. Department of Agriculture in coöperation with Department of Agriculture, State of North Carolina.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF THIRD CREEK AT MCHENRY'S BRIDGE, NEAR STATESVILLE, N. C.

	Year									
Week	1913	1914	1915	1916	1917	1918	1919	1920	1921	
1		246	138	84	73	62	259	65	122	
2		51	180	73	70	106	89	67	329	
3		44	218	63	87	98	102	74	225	
4		47	66	71	93	102	186	231	146	
5		58	136	420	214	193	94	205	196	
6		73	70	69	69	82	89	112	505	
7		65	63	57	64	71	136	98	154	
8		249	156	112	200	91	278	109	265	
9		76	74	99	394	70	237	99	133	
10		63	115	73	243	73	442	150	125	
11	107	117	61	66	107 296	66 83	121	213 182	123 128	
12		65	56	66			103			
13	174	64	57	68	127	7,5	102	224	141	
14	73	99	64	102	211	79	95	463	123	
15	159	210	63	88	109	90	186	291	121	
16	61	112	56	69	82	238	113	178	171	
17	112	66	. 53	62	81	113	110	130	186	
18	52	58	56	61	87	83	128	117	183	
19	57	57	136	67	78	86	148	147	203	
20	49	48	53	56	70	98	134	110	134	
21	101	44	97	207	83	79	117	102	134	
22	57	44	332	66	61	65	102	89	119	
23	80	43	84	150	76	93	126	224	129	
24	43	52	145	202	66	109	90	98	111	
25	45	41	49	114	58	68	92	121	110	
26	58	48	49	160	66	69	134	92		
27	50	85	_ 237	271	81	58	107	99		
28	53	57	106	513	97	61	80	132		
29	9.7	41	122	486	180	75	513	186		
30	63	60	45	264	175	156	111	110		
31	140	42	106	103	271	88	106	98		
32	164	40	79	165	65	65	167	160		
33	46	76	156	79	59	158	118	252		
34	251	39	185	70	90	78	99	133		
35	168	62	323	141	548	90	109	244		
36	197	36	82	69	50	90	91	106		
37	43	36	52	64	45	61	94	111		
38	62	36	43	. 65	43	103	92	98		
39	41	98	41	117	47	73	91	232		
40	39	89	433	63	45	59	102	126		
41	40	103	78	61	46	59	105	98		
42	97	217	73	195	46	60	101	98		
43	106	48	62	68	48	141	154	98		
44	41	- 40	51	64	58	297	100	98		
45	117	42	50	63	48	73	94	94		
46	43	64	62	62	51	90	185	204		
47	41	42	169	63	52	80	108	111		
48	150	145	54	64	50	200	104	293		
49	69	303	47	63	54	78	131	310		
50	44	79	60	101	56	241	. 243	330		
51	49	81	257	83	64	398	126	137		
52	125	282	255	80	53	193	110	172		



MONTHLY DISCHARGE OF THIRD CREEK AT McHenry's Bridge Near Statesville, N. C. [Drainage area, 69 square miles]

	Variation of the same	Discharges i	n Second-fee	et	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1019					
1913 March 17-31	443	76	142	2.06	1.15
April	587	56	99.2	1.43	1.60
May	335	44	65.2	.945	1.09
June	226	37	55.9	.810	.90
July	159	37	63.2	.916	1.06
August	1,180 480	41	169 82.7	2.45 1.20	2.82 1.34
September	370	37	67.6	.980	1.13
November	389	41	59.2	.858	.96
December	526	44	96.1	1.39	1.60
1914					
January	1,000	44	94.0	1.36	1.57
February	878	50	112	1.62	1.69
MarchApril	244 515	56 56	77.6 118	1.12 1.71	1.29
May	61	44	50.3	.729	.84
June	107	33	46.3	.671	.75
July	261	30	58.8	.852	.98
August	222	33	53.2	.771	.89
September	400	33	50.8	.736	.82
October	895 244	37	107	1.55	1.79
November	1,060	37 61	53.3 197	.772 2.86	.86 3.30
The year	1,060	30	84.8	1.23	16.69
1915	270				0 '0 "
January	678 622	56 56	141 110	2.04 1.59	2.35 1.66
March	261	56	71.3	1.03	1.19
April	107	50	58.8	.852	.95
May	491	50	89.5	1.30	1.50
June	1,280	41	136	1.97	2.20
July	806	44	121	1.75	2.02
August	1,240 156	41 41	185 55.0	2.68	3.09
September	1,190	41	151	.797 2.19	2.52
November	733	50	81.4	1.18	1.32
December	1,290	44	151	2.19	2.52
The year	1,290	41	113	1.64	22 .21
1916	107	56	74.7	1.08	1,24
JanuaryFebruary	1,510	56	161	2.33	2.51
March.	156	61	74.5	1.08	1.24
April	207	61	79.1	1.15	1.28
May	620	56	95.7	1.39	1.60
June	589	56	147	2.13	2.38
July	1,480	69	358	5.19	5.98
August September	569 443	61 56	115 78.2	1.67 1.13	1.92 1.26
October -	932	61	93.8	1.36	1.57
November	76	61	63.3	.918	1.02
December	298	56	80.5	1.17	1.35
The year	1,510	56	118	1.71	23.35

MONTHLY DISCHARGE OF THIRD CREEK AT MCHENRY'S BRIDGE NEAR STATESVILLE, N. C.—Continued

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1917					
January	457	57	96.1	1.39	1.60
February	517	59	122	1.77	1.84
March	1,270	70	2,50	3.62	4.17
April	711	78	119	1.72	1.92
May	170	59	76.8	1.11	1.28
June	156	57	66.3	.961	1.07
July	556	57	126	1.83	2.11
August	1,960	57	177	2.57	2.96
September	1,380	43	96.9	1.40	1.56
October	106	44	48.7	.706	.81
November	52	48	50.0	.725	.81
December	78	48	56.5	.819	.94
The year	1,960	43	107	1.55	21.07
1918	400	40	110	1 00	1.07
January	400	48	112	1.62	1.87
February	156	59	85.3	1.24	1.29
March	106	57	73.9	1.07	1.23
April	887	59	126 84.0	1.83	2.04
May	191	59 57	82.4	1.19	1.41
June	361 457	54	90.9	1.19	1.53
JulyAugust	730	57 57	95.0	1.32	1.52
	191	59	80.8	1.38	1.39
September	887	57	126	1.17	2.11
November	789	59	111	1.61	1.80
December	1,180	78	217	3.14	3.62
The year	1,180	48	107	1.55	21.11
January	557	81	153	2.22	2.56
February	707	89	158	2.29	2.38
March	1,230	98	208	3.01	3.47
April	652	89	125	1.81	2.02
May	246	98	129	1.87	2.16
June	307	81	111	1.61	1.80
July	1, 160	65	189	2.74	3.16
August	572	91	125	1.81	2.09
September	109	91	92.5	1.34	1.50
October	350	91	114	1.65	1.90
November	515	91	121	1.75	1.95
December	609	100	148	2.14	2.47
The year	1,230	65	140	2.03	27.46

MONTHLY DISCHARGE OF THIRD CREEK AT MCHENRY'S BRIDGE NEAR STATESVILLE, N. C.—Continued

		Discharges in Second-feet					
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches		
. 1920			/				
January	617	57	109	1.58	1.82		
February	585	81	130	1.88	2.03		
March	557	89	172	2.49	2.87		
April	1,140	117	265	3.84	4.28		
May	357	89	115	1.67	1.92		
June	444	89	131	1.90	2.12		
July	357	89	128	1.86	2.14		
August		89	187	2.71	3.12		
September	617	98	135	1.96	2.19		
October	189	98	104	1.51	1.74		
November	696	89	159	2.30	2.57		
December	1,160	117	237	3.43	3.95		
The year	1,160	57	156	2.26	30.75		
January	707	117	203	2.94	3.39		
February		117	275	3.99	4.16		
March	133	117	126	1.83	2.11		
April		117	152	2 20	2.46		
May		117	159	2.30	2.65		
June	189	98	117	1.70	1.90		

WILSON CREEK NEAR ADAKO, N. C.

Location. At pool 2½ miles northwest of Adako, Caldwell County, 3 miles above junction of Wilson Creek with Johns River and 4½ miles downstream from mouth of Harpers Creek.

Drainage Area. 66 square miles (measured on topographic maps). Records Available. July 27, 1921 to May 31, 1922, when the station was

GAGE. Standard enameled staff in two sections in a pool at proposed lower dam site. Lower section is fastened to a vertical timber bolted to a large rock near right bank; upper section is fastened to rock on right bank in line with lower section. Gage read by W. H. Thompson. Datum of gage above sea level, 1.144.00 feet.

DISCHARGE MEASUREMENTS. Low water measurements are made by wading just above control. A cable for high water measurements was never installed.

Channel and banks composed mostly of solid bed rock and very steep; banks are the sides of the gorge. Control is a solid rock ledge; permanent.

EXTREMES OF DISCHARGE. 1916-1922: Crest of great flood of July, 1916, approximately 27.0 feet (estimated discharge, 7,500 second-feet); minimum stage recorded, 1.30 feet October 21 to 27, 1921 (discharge, 52 second-feet).

ICE. Probably never enough to affect stage-discharge relation. REGULATION. Probably none.

Accuracy. Stage-discharge relation permanent. Rating curve well defined between 50 and 120 second-feet; extended above. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except high water which may be subject to error.

COOPERATION. Granite Falls Manufacturing Co., permittees of Federal Power Commission Project No. 81.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF WILSON CREEK NEAR ADAKO, N. C.

	Year	r		Year			
Week 1921		1922	1922 Week		1922		
1		86	27				
2		94	28				
3		122	29				
4		137	30				
5		119	31				
6		141	32	108			
7		175	33	133			
8		129	34	104			
9		165	35	90			
10		186	36	87			
11		190	37	107			
12		148	38	85			
		305	39	83			
14		206	40	74			
15		159	41	62			
16		147	42	58			
		138	43	52			
18		218	44	231			
19		169	45	110			
20		272	46	92			
		191	47	118			
			48	113			
23			49	121			
24			50	91			
			51	139			
26			52	99			

Monthly Discharge of Wilson Creek Near Adako, N. C. [Drainage area, 66 square miles]

		Discharges in Second-feet					
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches		
1921							
July 27-31	165	120	143	2.17	.40		
August	176	84	112	1.70	1.96		
September	231	70	90.4	1.37	1.53		
October	385	52	81.9	1.24	1.43		
November	301	88	119	1.80	2.01		
December	250	83	113	1.71	1.97		
1922							
January	280	72	110	1.67	1.92		
February	260	111	140	2.14	2.23		
March	451	122	206	3.12	3.60		
April	280	120	165	2.50	2.79		
May	473	132	207	3.14	3.62		
	1.0	102		0.11	0.02		

BROAD RIVER AT UREE, N. C.

LOCATION. At Uree, Rutherford County, 3 miles below mouth of Buffalo Creek and 4 miles above mouth of Cove Creek.

Drainage Area. 100 square miles. Records Available. May 17, 1907 to June 30, 1909, when station was discon-

GAGE. Vertical staff gage on right bank about 130 feet below bridge. DISCHARGE MEASUREMENTS. Made from bridge.

CHANNEL AND CONTROL. Rocky and fairly permanent. Both banks are high and

not subject to overflow.

Extremes of Discharge. Maximum stage recorded, 9.2 feet August 25, 1908 (discharge estimated, 5,400 second-feet); minimum stage, 1.5 feet numerous times in 1907 (discharge, 117 second-feet).

ICE. Stage-discharge relation probably not affected by ice.

REGULATION. Probably none.

ACCURACY. Records approximate owing to insufficient data.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF BROAD RIVER AT UREE, N. C.

		Year				Year	
Week				Week		4	
	1907	1908	1909		1907	1908	1909
1		194	347	27	122	280	
2		453	272	28	122	279	
3		238	348	29	115	178	
4		168	249	30	92	341	
5		184	223	31	124	202	
6		193	243	32	109	337	
7		558	275	33	127	229	
8		255	368	34	168	1,235	
9		235	290	35	96	403	
10		217	303	36	96	327	
11		199	391	37	85	240	
12		292	322	38	183	212	
13		240	315	39	120	210	
14		194	260	40	88	183	
15		217	283	41	79_	288	
16		221	251	42	75	191	
17		267	246	43	77	641	
18		210	300	44	87	410	
19		273	266	45	82	272	
20	149	228	537	46	97	246	
21	145	243	592	47	177	220	
22	286	223	371	48	102	223	
23	194	202	546	49	97	251	
24	179	199	422	50	237	226	
25	159	188	364	51	190	259	
26	154	159	420	52	236	243	

Monthly Discharge of Broad River at Uree, N. C. [Drainage area, 100 square miles]

		Discharges i	n Second-fee	t	Run-off in Inches
Month	Maximum	Minimum	Mean	Per Square Mile	
1907					
June	910	149	205	2.05	
July		88	116	1.16	1.34
August		88	128	1.28	1.48
September		62	119	1.19	1.28
October		75	79	.79	.911
November.		62	115	1.15	1.24
December		88	185	1.85	2.13
1908					
January	860	149	252	2.52	2.94
February		149	306	3.06	3.30
March		183	236	2.36	2.72
April		183	228	2.28	2.46
May		183	237	2.37	2.73
June		149	191	1.91	2.06
July	710	149	264	2.64	3.04
August		183	508	5.08	5.86
September		183	251	2.51	2.71
October	1,920	183	345	3.45	4.00
November	345	220	252	2.52	2.72
December	480	202	• 243	2.43	2.80
The year	5,400	149	276	2.76	37.34
1909	000	100	205	0.05	0.40
January		183	295	2.95	3.40
February	435	220	288	2.88	3.00
	660	260	327		
April		220	260	2.60	2.90 4.71
May		220	421	4.21	
June	760	302	434	4.34	4.84

GREEN RIVER NEAR SALUDA, N. C.

LOCATION. At the lower steel bridge, 1 mile above the mouth of Hungry Creek 3 miles northeast of Flat Rock, N. C., 3 miles west of Saluda, Henderson County and 5 miles southeast of Henderson ville, N. C.

Drainage Area. 51 square miles.

RECORDS AVAILABLE. May 9, 1907 to June 30, 1909, when the station was discontinued.

GAGE. Chain gage attached to the bridge; read by J. C. Gordon.

DISCHARGE MEASUREMENTS. Made from bridge to which gage is attached.

CHANNEL AND CONTROL. Bed partly rock; permanent. Banks probably not subject to overflow. Current slow at low water. Control not known.

Extremes of Discharge. Maximum stage recorded, 7.60 feet February 15, 1908 (discharge, 3,920 second-feet); minimum stage recorded, 1.40 feet several days in August, September and November 1907 (discharge, 40 second-feet).

ICE. Stage-discharge relation not affected by ice.

REGULATION. Probably none.

Accuracy. Stage-discharge relation permanent. Rating curve well defined for low water and fairly well defined for higher stages. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION. United States Forest Service.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF GREEN RIVER AT SALUDA, N. C.

		Year			Year			
Week 1907	1908	1909	Week	1907	1908	1909		
1		219	317	27	91	162		
2		234	185	28	85	120		
3		227	205	29	76	99		
4		171	171	30	66	155		
5		165	142	31	58	109		
6		168	209	32	56	124		
7		1,014	210	33	66	92		
8		309	358	34	68	883		
9		257	271	35	47	293		
0		185	238	36	58	205		
1		175	258	37	53	148		
2		268	320	38	173	130		
3	-	211	299	39	88	126		
4		164	194	40	58	103		
5		177	200	41	70	135		
6		218	167	42	52	101		
7		251	190	43	52	301		
8		185	386	44	73	232		
9		225	249	45	60	145		
0	105	164	302	46	63	139		
1	124	139	253	47	249	130		
2	174	125	235	48	113	123		
3	169	150	1,029	49	104	221		
4	113	118	403	50	486	161		
5	98	98	312	51	342	195		
6	181	87	206	52	318	175		

Monthly Discharge of Green River at Saluda, N. C. [Drainage area, 51 square miles]

•					
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907		- 1			
May 9-31	255	96	114	2.24	1.92
June	670	80	154	3.02	3.37
July	112	52	80.2	1.57	1.81
August	96	40	59.4	1.16	1.34
September	950	40	89.5	1.75	1.95
October	151	52	57.5	1.13	1.30
November	480	40	119	2.33	2.60
December	1,340	66	299	5.86	6.76

MONTHLY DISCHARGE OF GREEN RIVER NEAR SALUDA, N. C .- Continued

		Discharges in	Second-fee	t		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1908						
January	830	151	227	4.45	5.13	
February	3,920	151	424	8.31	8.96	
March	525	151	213	4.18	4.82	
April	525	130	202	3.96	4.42	
May	480	112	170	3.33	3.84	
June	287	80	116	2.27	2.53	
July	480	80	132	2.59	2.99	
August	3,730	80	317	6.22	7.17	
September	287	112	156	3.06	3.41	
October	950	96	174	3.41	3.93	
November	199	96	141	2.76	3.08	
December	525	66	184	3.61	4.16	
The year	3,920	66	205	4.01	54.44	
January	1.070	130	212	4.16	4.80	
February	620	130	245	4.80	5.00	
March	1,070	174	274	5.37	6.19	
April	287	151	189	3.71	4.14	
May	1,130	151	286	5.61	6.47	
June	2,630	199	487	9.55	10.66	

SECOND BROAD RIVER NEAR LOGANS STORE, N. C.

LOCATION. Two miles south of Logans Store, Rutherford County, 2 miles above the mouth of Catheys Creek and 6 miles northeast of Rutherfordton, N. C.

Drainage Area. 98 square miles. Records Available. May 16, 1907 to June 30, 1908, when station was discontinued.

GAGE. Staff gage attached to tree on right bank about 100 yards below bridge;

read by J. A. Mode.

DISCHARGE MEASUREMENTS. Made from wagon bridge.

CHANNEL AND CONTROL. Bed of stream sandy; shifting. Current swift. Control not known. Right bank subject to overflow; left bank high and not subject to overflow.

Extremes of Discharge. Maximum stage recorded, 9.0 feet December 23, 1907 (discharge not determined); minimum stage recorded, 1.1 foot September 20 to 22, 1907 (discharge, 60 second-feet).

Ice. Stage-discharge relation not affected by ice.

Regulation. Probably none.

Accuracy. Stage-discharge relation shifting. Rating curves poorly defined.

Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records poor.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF SECOND BROAD RIVER NEAR LOGANS STORE, N. C.

	Yea	r		Year			
Week	1907	1908	Week	1907-	1908		
		1 1 E E E					
1		164	27	124			
2			28	98			
3		149	29	79			
4		102	30	70			
5		111	31	79			
6		134	32	81			
7			33	85			
8			34	106			
9		161	35	72			
10		140	36	79			
11		131	37	80			
12			38	65			
13		155	39	107			
14		131	40	79			
15		115	41	74			
16		148	42	70			
17		142	43	75			
18		131	44	83			
19		145	45	73			
20	102	119	46	72			
21	114	119	47				
22	103	110	48	111			
23	137	106	49	88			
24	117	124	50				
25	102	122	51	142			
26	115	101	52	146			

KANAWHA RIVER BASIN

NORTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.

LOCATION. Half a mile above confluence of North and South forks of New River and 2½ miles north of Crumpler, Ashe County.

Drainage Area. 279 square miles.

RECORDS AVAILABLE. August 13, 1908 to September 30, 1916, when station was discontinued.

GAGE. Chain gage attached to posts on right bank until July 24, 1911, when a staff gage was installed at the same place and at the same datum as the chain

gage, read by J. J. Garvey.

DISCHARGE MEASUREMENTS. Made from a boat at a section one-eighth mile below gage or by wading. The boat cable section was formerly at a ford one-fourth mile above gage, but was moved July 23, 1911, to a point one-eighth

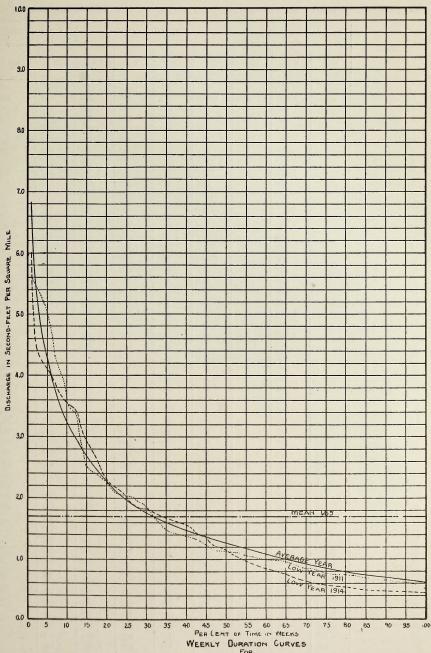
mile below gage.

Channel and Control. Practically permanent.

Extremes of Discharge. 1908-1916: Maximum stage recorded, 22.4 feet about REMES OF DISCHARGE. 1908-1916: Maximum stage recorded, 22.4 feet about 11 p.m. July 15, 1916 (discharge, roughly, 24,000 second-feet, allowing for about 3.5 feet of backwater from the South Fork). Observer stated flood of September 12, 1878, was about 3 feet lower than the flood of July, 1916, at his residence which is near the gage. Farther up the river, however, the flood of 1878 was about half a foot higher than the flood of July, 1916. The floods of April 20, and May 20, 1901, reached a stage of about 16.4 feet by the present gage. Minimum stage recorded, 1.10 feet, afternoon reading, July 2, 1914 (discharge, 108 second-feet).

ICE. Stage-discharge relation affected by ice for short periods during severe winters. Accuracy. Stage-discharge relation arected by ite for short periods during severe winters.

Accuracy. Stage-discharge relation practically permanent. Rating curve well defined between 150 to 2,000 second-feet; beyond these limits the curve is an extension. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Daily discharge for July 15 and 16, 1916, derived from mean daily gage-height determined from a gage-height hydrograph based on the crest stage of the flood reduced 3.5 feet for healtware and the gage. for backwater and the gage readings of July 14 and 17. Records excellent.



WEEKLY DURATION CURVES
FOR
NORTH FORK OF NEW RIVER AT CRUMPLER, N G

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF NORTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.

					Year				
Week	1908	1909	1910	1911	1912	1913	1914	1915	1916
1		1,460	600	1,421	411	405	291	828	903
2		748	446	382	357	406	479	837	1,188
3		924	430	309	400	305	328	1,020	541
4		594	468	585	398	557	439	866	608
5		491	392	967	784	534	607	1,074	901
6		938	368	943	328	391	784	725	613
7		892	968	569	292	277	388	423	396
8		1,073	651	381	785	344	1,150	495	492
9		848	665	312	753	610	540	469	657
10		995	460	1,494	674	352	428	405	914
11		1,026	310 259	657 460	1,620 809	1,793	1,021 703	360 328	490
12		676 1,296	259	678	1,210	611 2, 192	1,043	328	732
14		609	209	1,567	1,173	454	841	323	548
15		758	232	1,197	455	1,104	588	439	858
16		584	309	1,121	396	684	959	312	471
17		453	488	539	496	389	507	345	369
18		888	287	569	574	305	455	331	299
19		666	491	407	488	278	493	347	262
20		479	336	533	602	312	320	297	242
21		1,481	425	315	342	1,338	246	387	369
22		743	272	267	409	885	219	483	256
23		1,580	355	405	288	397	259	346	258
24		700	1,273	237	269	298	188	344	508
25		585	760	236	246	288	169	225	333
26		559	395	294	364	304	139	188	265
27		644	635	285	702	412	180	245	202
28		566	601	280	367	215	249	256	1,985
29		339	384 298	185	316 286	178	223	254 200	5,782 1,179
30		348 422	806	159 209	310	195 201	146 138	231	804
32		307	272	189	252	249	131	184	1,401
33	308	446	231	176	215	249	135	331	1,089
34	633	256	251	142	480	410	131	288	709
35	476	209	444	345	221	248	380	569	417
36	395	226	499	176	228	319	132	1,517	375
37	268	239	288	202	178	191	155	468	391
38	240	267	208	224	404	499	165	313	292
39	256	238	223	172	404	261	128	352	285
40	208	185	223	192	195	201	138	1,288	
41	371	463	296	202	175	193	130	424	
42	232	379	224	629	207	215	509	355	
43	1,390	277	206	277	188	366	200	297	
44	1,276	220	224	195	169	224	160	240	
45	448	222	193	354	267	252	156	224	
46	443	202	197	314	204	311	339	264	
47	494	205	187 297	297	176 212	261	232	647	
48	497	189 229	645	266 211	212	262 269	979 1,872	345 270	
49 50	1,245 853	286	281	235	186	263	461	323	
51	607	240	257	437	174	209	635	1,632	
52	995	350	453	688	345	302	1,201	1,169	
02	000	000	100	000	010	002	1,201.	2,100	

Monthly Discharge of North Fork of New River Near Crumpler, N. C. [Drainage area, 279 square miles]

		t			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1908					
August 12-31	1,470	270	475	1.70	1.26
September	675	213	294	1.05	1.17
October	4,320	200	680	2.44	2.81
November	1,040	360	494	1.77	1.98
December	3,180	522	920	3.30	3.80
1909					=======
January	2,590	286	883	3.16	3.64
February	2,590	422	910	3.26	3.40
March	2,370	550	969	3.47	4.00
April	1,290	400	608	2.18	2.43
May	3,540	380	866	3.10	3.57
June	3,930	445	857	3.07	3.42
July	1,120	270	465	1.67	1.92
August	775 422	200 188	339 244	1.22	1.41
September		188	316	.875	.98
October	1,380	176	207	1.13 .742	1.30
November December	286 610	166	296	1.06	.83
December	010	100	290	1.00	1.22
The year	3,930	166	580	2.08	28.12
1910					
January	1,560	226	474	1.70	1.96
February	2,150	188	605	2.17	2.26
March.	1,040	226	382	1.37	1.58
April	1,120 675	176 254	307 376	1.10 1.35	1.23
May	1,750	204	663	2.38	1.56
July	1,750	240	460	1.65	2.66 1.90
August	955	176	282	1.01	1.16
September	845	188	329	1.18	1.10
October -	470	176	237	.849	.98
November	400	176	210	.753	.84
December	1,850	138	407	1.46	1.68
The year	2,150	138	394	1.41	19.13
1911					
January	2,590	286	734	2.63	3.03
February	1,750	304	611	2.19	2.28
March	2,700	270	763	2.73	3.15
April	3,180	445	1,070	3.84	4.28
May	1,020	240	429	1.54	1.78
June	708	200	294	1.05	1.17
July	675	147	222	.796	.92
August	955	130	211	.756	.87
September	360	156	200	.717	.80
October	1,470	156	314	1.13	1.30
November	610	176	295	1.06	1.18
December	1,120	200	393	1.41	1.63
The year	3,180	130	461	1.65	22.39

MONTHLY DISCHARGE OF NORTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.-Continued

		Discharges in	n Second-fee		and the same of th
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inche
1912					
1912 January	1,470	270	456	1.63	1.
February	1,470	270	559	2.00	2
March	2,940	445	1,010	3.62	4.
April	2,050	341	646	2.32	2.
May	1,040	286	473	1.70	1
June	775	200	310	1.11	1.
July	1,290	226	408	1.46	1
August	1,120	200	300	1.08	1.
September	1,380	166	297	1.06	1.
October	270	166	189	.677	
November	445	156	209	.749	
December	775	147	235	.842	
The year	2,940	147	424	1.52	20
1913 January	1,290	254	439	1.57	1
February	1,200	240	392	1.41	1
Aarch	7,110	270	1,170	4.19	4
pril	2,820	360	649	2.33	2
Iay	2,700	240	644	2.31	2
une	675	226	342	1.23	1
uly	845	156	247	.885	1
ugust	955	156	282	1.01	1
eptember	1,200	166	309	1.11	1
October	708	176	243	.871	1
November	495	200	256	.918	1
December	495	200	270	.968	1
The year-	7,110	156	436	1.56	21
1914 anuary	1,120	270	406	1.46	1
ebruary	2,150	254	730	2.62	2
Iarch	1,950	380	736	2.64	3
pril	1,660	360	741	2.66	2
Iav	955	213	359	1.29	1
une	422	122	193	.692	
uly	470	122	194	.695	
ugust	1,290	108	188	.674	
eptember	254	122	146	.523	
October	1,660	122	237	.849	
November	1,380	147	265	.950	1
December	3,930	254	1,130	4.05	4
The year	3,930	108	443	1.58	21

MONTHLY DISCHARGE OF NORTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.—Continued

		Discharges i	n Second-fee	t		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1915						
January	2,480	422	855	3.06	3.53	
February	2,050	380	696	2.49	2.59	
March	470	304	365	1.31	1.51	
April	642	254	355	1.27	1.42	
May	880	226	348	1.25	1.44	
June	642	176	308	1.10	1.23	
July	445	147	. 233	0.835	0.96	
August	1,120	156	325	1.16	1.34	
September	4,840	213	647	2.32	2.59	
October	3,670	254	558	2.00	2.31	
November	1,660	200	355	1.27	1.42	
December	4,980	226	824	2.95	3.40	
The year	4,980	147	489	1.75	23.74	
January	2,590	495	783	2.81	3.24	
February	1,560	322	608	2.18	2.35	
March	1,290	400	662	2.37	2.73	
April	1,200	322	552	1.98	2.21	
May	740	213	288	1.03	1.19	
June	955	213	332	1.19	1 33	
July	17,700	166	2,120	7.60	8.76	
August	2,480	400	928	3.33	3.84	
September	740	240	338	1.21	1.35	
	l.					

SOUTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.

Location. 1.6 miles above confluence of North and South forks of New River and 4 miles from Crumpler, Ashe County.

Drainage Area. 325 square miles.

RECORDS AVAILABLE. August 12, 1908 to September 30, 1916, when station was discontinued.

Gage. Chain gage attached to trees on left bank; read by J. J. Garvey.

DISCHARGE MEASUREMENTS. Made from a boat at a section about half a mile below gage or by wading at a section 500 feet below gage.

below gage or by wading at a section 500 feet below gage.

CHANNEL AND CONTROL. Practically permanent.

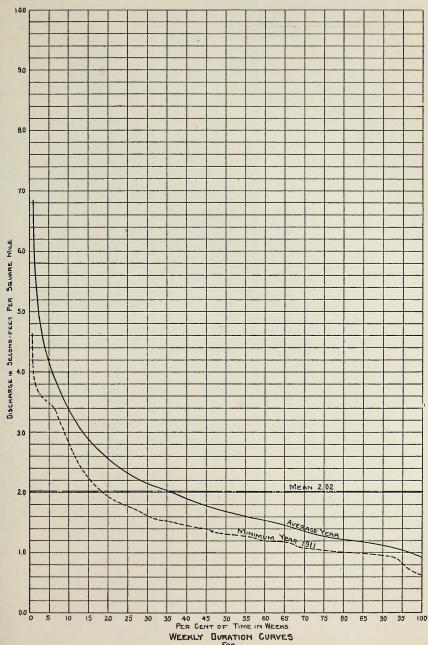
EXTREMES OF DISCHARGE. 1908-1916: Maximum stage recorded, previous to flood, July, 1916, 7.00 feet, morning reading, October 24, 1908 (discharge, 10,600 second-feet); minimum stage, 0.85 foot, afternoon reading, July 27, 1911 (discharge, 205 second-feet). The crest of the flood of July, 1916, occurred about 11 p.m. July 15; stage as determined by leveling, July 25, was 21.3 feet (discharge, roughly, 46,000 second-feet). This flood exceeded the flood of 1878 by about 3 feet; a building which had been standing for more than 100 years was carried away by the water.

ICE. Lee seldom forms in sufficient quantity to affect stage-discharge relation.

ICE. Ice seldom forms in sufficient quantity to affect stage-discharge relation. Accuracy. Stage-discharge relation practically permanent. Rating curve well defined between 200 and 3,500 second-feet; beyond these limits the curve is an extension. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Mean Weekly Discharge, in Second-feet, of South Fork of New River Near Crumpler, N. C.

					Year				
Week	1908	1909	1910	1911	1912	1913	1914	1915	1916
1		1,157	538	1,138	534	476	496	1,165	1,134
2		807	652	502	407	412	635	1,329	1,031
3		941	504	424	457	373	505	1,509	752
4		692	579	461	485	529	497	1,186	1,194
5		754	468	472	541	529	1,072	1,575	1,528
6		868	464	600	450	422	919	1,186	1,066
7		1,022	889	489	476	389	615	1,049	806
8		1,353	789	429	948	469	1,075	1,033	853
9		981	862	387	818	642	671	913	899
10		973	595	896	737	449	641	863	829
11		807	475	557	1,537	1,941	767	727	692
12		811	434	461	916	906	683	666	687
13		1,066	391	687	1,182	2,810	690	609	896
14		721	425	1,146	922	864	711	602	744
15		1,249	397	1,336	657	1,750	942	639	871
16		889	458	1,092	613	1,137	1,129	532	636
17	,	699	439	657	687	797	679	658	567
18		941	362	618	645	649	685	594	543
19		1,443	534	511	898	648	658	595	475
20		902	399	517	1,077	716	495	490	459
21		3,210	506	429	599	1,739	433	535	684
22		1,229	352	412	596	1,048	412	769	614
23		1,900	416	420	589	841	558	543	491
24		1,161	1,490	335	559	634	409	572	906
25		921	634	331	413	604	367	516	682
26		1,014	591	319	590	486	293	396	617
27		923	668	317	595	539	403	485	488
28		745	713	347	684	404	379	392	5,884
29		538	602	326	807	355	486	524	9,443
30		647	421	225	565	401	284	475	2,316
31		774	413	334	543	393	275	375	1,800
32		580	369	348	453	528	281	404	1,531
33	550	716	337	262	387	453	304	530	1,281
34	1,353	461	373	214	368	547	257	654	1,163
35	1,076	403	1,009	579	305	364	483	914	854
36	777	408	693	326	357	735	256	2,119	743
37	568	423	461	307	357	393	294	939	978
38	495	614	360	570	456	1,222	341	666	634
39	544	511	694	376	498	534	266	608	733
40	455	395	689	302	369	445	323	1,936	
41	874	826	1,072	312	335	412	278	881	
42	492	534	558	1,065	378	479	1,500	792	
43	2,833	420	444	456	371	964	468	657	
44	1,567	387	420	341	324	508	351	567	
45	838	405	380	491	644	566	341	526	
46	743	388	373	477	393	465	798	589	
47	713	374	347	416	340	424	478	991	
48	659	344	374	387	382	518	1,744	688	
49	900	463	662	351	417	540	2,967	538	
50	752	757	432	387	369	499	1,023	572	
51	673	478	408	744	347	384	896	1,372	
52	879	370	552	808	496	531	1,269	1,706	



WEEKLY BURATION CURVES FOR SOUTH FORK OF NEW RIVER AT CRUMPLER, N.C. 1909-1915

Monthly Discharge of South Fork of New River Near Crumpler, N. C. [Drainage area, 325 square miles]

		Discharges in Second-feet					
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches		
1908							
August 12-31	3,900	485	996	3.06	2.28		
September	980	450	604	1.86	2.08		
October	8,540	420	1,250	3.85	4.44		
November	1,340	561	799	2.46	2.74		
December	1,530	561	799	2.46	2.84		
1909							
January	1,660	650	875	2.69	3.10		
February	2,080	561	1,050	3.23	3.36		
March.	1,340	650	915	2.82	3.25		
April	2,850	561	884	2.72	3.04		
May	9,200	650	1,610	4.96	5.72		
June	3,900	862	1,240	3.82	4.26		
July	1,160	485	721	2.22	2.56		
August	1,160	391	598	1.84	2.12		
September	980	366	483	1.49	1.66		
	1,800	391	529	1.63	1.88		
October	520	340	381				
November				1.17	1.30		
December	1,530	340	500	1.54	1.78		
The year	9,200	340	816	2.51	34.08		
1910	1 000	201		1 71	1 05		
January	1,280	391	555	1.71	1.97		
February	2,380	366	677	2.08	2.17		
March.	1,220	391	546	1.68	1.94		
April	750	340	427	1.31	1.46		
May	804	318	442	1.36	1.57		
June	2,380	318	747	2.30	2.57		
July	1,160	391	585	1.80	2.08		
August	1,160	318	395	1.22	1.41		
September	3,020	340	615	1.89	2.11		
October	2,080	391	665	2.05	2.36		
November	420	340	374	1.15	1.28		
December	1,100	318	505	1.55	1.79		
The year	3,020	318	544	1.67	22.71		
January	1,800	391	619	1.90	2.19		
February	862	391	488	1.50	1.56		
March.	1,340	366	619	1.90	2.19		
April	2,230	520	1,030	3.17	3.54		
May	697	391	498	1.53	1.76		
June	450	295	363	1.12	1.25		
July	650	205	297	.914	1.05		
	980	205	335	1.03			
August		255	413		1.19		
September	1,400			1.27	1.42		
October	3,540	275	518	1.59	1.83		
November	650	318	432	1.33	1.48		
December	1,460	318	568	1.75	2.02		
	3,540	205	515	1.58	21.48		

MONTHLY DISCHARGE OF SOUTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.—Continued

		Discharges in	Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1912					
January	804		487	1.50	1.73
February	2,230		656	2.02	2.18
March	2,530	602	1,030	3,17	3.66
April	1,340	520	744	2.29	2.56
May	1,940	485	783	2.41	2.78
June	980	391	543	1.67	1.86
July	1,220	450	662	2.04	2.35
August	520	295	396	1.22	1.41
September	1,400	275	454	1.40	1.56
October-	450	318	359	1.10	1.27
November	1,340	318	428	1.32	1.47
December	697	340	409	1.26	1.45
The year	2,530		579	1.78	24.28
1913					
January	1,040	340	463	1.42	1.64
February	1,040	340	460	1.42	1.48
March	8,320	391	1,420	4.37	5.04
April	3,360	697	1,120	3.45	3.85
May	4,080	520	983	3.02	3.48
June	1,040	450	664	2.04	2.28
July	804	340	426	1.31	1.51
August	980	340	466	1.43	1.65
September	3,020	340	696	2.14	2.39
October	2,080	366	574	1.77	2.04
November	862	391	467	1.44	1.61
December	920	366	512	1.58	1.82
The year	8,320	340	688	2.12	28.79
January	2,380	450	588	1.81	2.09
February		400	880	2.71	2.82
March	920	450	679	2.09	2.41
April	2,380	561	862	2.65	2.96
	920	391	545	1.68	1.94
May	804	255		1.08	1.94
June	804	255	411 377	1.26	1.41
July		255		- 1	1.34
August	862		326	1.00	
September		238	288	.886	.99
October	5,420	255	616	1.90	2.19
November	1,800	318	539	1.66	1.85
December	5,820	697	1,710	5.26	6.06
The year	5,820		652	2.01	27.21

MONTHLY DISCHARGE OF SOUTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.—Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1915					
January	3,020	697	1,260	3 .88	4.47
February		804	1,220	3.75	3.90
March	920	602	735	2.26	2.61
April		520	611	1.88	2.10
May		450	556	1.71	1.97
June		366	558	1.72	1.92
July		340	460	1.42	1.64
August		295	575	1.77	2.04
September		485	1,060	3.26	3.64
October		561	1,020	3.14	3.62
November.		520	686	2.11	2.35
December	4,080	520	1,040	3.20	3.69
The year	5,620	295	815	2.51	33.95
January	1,460	697	1,030	3.17	3.66
February	2,380	697	1,040	3.20	3.45
March	1,340	602	790	2.43	2.80
April	1,040	520	698	2.15	2.40
May	1,100	391	559	1.72	1.98
June	1,800	450	661	2.03	2.26
July	30,500	420	4,220	13.00	14.99
August	2,690	862	1,340	4.12	4.75
September	1,800	520	774	2.38	2.66

TENNESSEE RIVER BASIN WATAUGA RIVER AT BUTLER, TENN.

LOCATION. At county highway bridge at Butler, Johnson County, 800 feet above Virginia and Southwestern Railroad bridge. Roane Creek enters just above gage and Elk Creek enters 1 mile above.

Drainage Area. 427 square miles (measured on topographic maps). Records Available. July 30, 1900 to December 28, 1901 and November 2, 1920 to December 31, 1923.

Gage. During 1900-01, vertical staff fastened to tree on right bank 100 yards below mouth of Roane Creek. Gage used 1920-1922, was chain gage attached to downstream side of bridge near right end. Old gage and all bench marks destroyed by flood in 1920; new gage at independent datum.

DISCHARGE MEASUREMENTS. Made from downstream side of highway bridge or.

by wading.

CHANNEL AND CONTROL. Bed composed of rock and gravel; smooth and uniform. Channel straight for 1,000 feet above and for 500 feet below bridge. Banks high but subject to overflow at extreme high water. Control is well-defined, rock and gravel shoal 300 feet below bridge; fairly permanent.

Extremes of Discharge. Maximum discharge recorded, 6,760 second-feet at 5 p.m. February 10, 1921 (gage height, 6.70 feet); minimum discharge, 120 second-feet February 23 and 24, 1901. A stage of 16.27 feet was reported

May 21, 1901.

ICE. Stage-discharge relation not affected by ice.

REGULATION. None.

ACCURACY. Stage-discharge relation not permanent. Three rating curves used, as follows: August 14, 1900 to December 28, 1901, fairly well defined below 2,000 second-feet; November 7, 1920 to May 19, 1922, well defined below 1,700 second-feet and extended above; May 20 to March 17, 1923, fairly well defined between 180 and 1,500 second-feet and extended beyond these limits. Gage read to tenths probably once daily in 1900-1901; to hundredths twice daily during 1920-1922. Daily discharge ascertained by applying daily or mean daily gage height to rating table. Records for 1900-01, fair below 2,000 second-feet; others poor. For 1920-1923, records good below 1,700 second-feet and fair above.

Note. Records of 1900 and 1901 are fragmentary, therefore omitted.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF WATAUGA RIVER AT BUTLER, TENN.

1920 1921 1922 1923 1923 1923 1923 1923 1924 1925 1925 1925 1926 1926 1926 1927 1928			Year		
2 758 419 3 1,055 1,707 4 957 1,600 5 1,094 595 6 2,120 1,018 7 1,396 2,196 8 989 894 9 650 1,609 10 521 1,723 11 482 2,109 12 505 966 13 644 1,368 14 589 1,125 15 425 809 16 1,073 952 17 748 1,408 18 1,518 1,374 19 1,071 1,052 20 642 1,233 21 661 1,029 22 514 677 23 420 731 24 358 450 25 379 382 26 329 355<	Week	1920	1921	1922	1923
2 758 419 3 1,055 1,707 4 957 1,600 5 1,094 595 6 2,120 1,018 7 1,396 2,196 8 989 894 9 650 1,609 10 521 1,723 11 482 2,109 12 585 966 3 644 1,888 14 589 1,125 15 425 809 16 1,073 952 17 748 1,408 18 1,518 1,374 19 1,071 1,052 10 642 1,233 11 642 1,233 12 661 1,029 14 677 1 19 1,071 1,052 22 514 677 23 420 7				077	1.0
3 1,055 1,707 4 057 1,000 5 1,094 595 6 2,120 1,018 7 1,396 2,196 8 989 894 9 650 1,609 0 551 1,723 1 482 2,109 2 595 968 3 644 1,368 4 589 1,125 5 425 809 6 1,073 952 7 748 1,408 4 589 1,125 5 425 809 6 1,073 952 7 748 1,408 8 1,518 1,374 9 1,071 1,052 0 642 1,823 1 661 1,029 2 514 667 3 420 731 </td <td></td> <td></td> <td></td> <td></td> <td>1,0</td>					1,0
4 957 1,000 5.5 1,994 595 6. 2,120 1,1018 7. 1,306 2,196 8 989 894 9. 650 1,609 0. 521 1,723 1 482 2,109 2 595 966 3. 644 1,868 4. 589 1,125 5. 425 809 6. 1,073 952 7. 748 1,408 8. 1,518 1,374 9. 1,071 1,052 0. 642 1,823 1. 661 1,029 2. 514 677 3. 420 731 4. 358 450 5. 379 382 6. 329 355 7. 341 592 8. 612 49					4
5. 1,094 595 6. 2,120 1,018 7. 1,336 2,196 3. 989 894 6. 650 1,609 9. 521 1,723 1. 482 2,109 2. 595 966 3. 644 1,368 4. 589 1,125 5. 425 809 5. 425 809 5. 425 809 6. 1,073 952 7. 748 1,408 3. 1,518 1,374 9. 1,071 1,052 9. 642 1,823 10. 642 1,823 11. 677 31 3. 420 731 4. 358 450 7. 341 592 3. 612 491 4. 358 4					5
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7. 1,396 2,196 8. 989 894 9. 650 1,609 1. 521 1,723 2. 482 2,109 2. 505 966 3. 644 1,368 4. 1,368 425 5. 425 809 1,073 952 748 7. 748 1,408 3. 1,518 1,374 4. 1,071 1,052 642 1,823 661 1,072 1,052 9. 661 1,029 2. 514 677 3. 420 731 4. 358 450 5. 379 382 3. 329 355 7. 344 592 3. 612 491 9. 1,002 836 551 429					2,6
989 894 650 1,609 521 1,723 482 2,109 595 966 448 1,368 4,36					1,6
650			1,396		1,8
521 1,723 482 2,109 595 966 644 1,368 589 1,125 425 809 1,073 952 748 1,408 1,518 1,374 1,071 1,052 642 1,823 661 1,029 514 667 420 731 358 450 379 382 329 355 341 592 612 491 1,002 336 551 429 890 382 550 287 1,135 267 624 245 371 216 368 219 371 216 369 338 370 368 219 47 420 47 41 196 1,135 267 242 190			989	894	6
			650	1,609	5
595 966			521	1,723	1,4
			482	2,109	2,3
644			595	966	1,6
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				982	4
		845	549	1,169	4
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MONTHLY DISCHARGE OF WATAUGA RIVER NEAR BUTLER, TENN. [Drainage area, 427 square miles]

		Discharges in Second-feet						
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inche			
1920								
November 7-30	1,350	233	457	1.07				
December	-	448	1,,050	2.46	2			
1921								
anuary	1,800	435	859	2.01	2.			
February	5,500	686	1,350	3.16	•3.			
Iarch.		442	552	1.29	1.			
pril		380	723	1.69	1.			
Iay	2,490	500	924	2.16	2.			
une	507	281	381	.892	1.			
uly		269	600	1.41	1.			
ugust	3,020	321	757	1.77	2			
eptember	618	265	346	.810				
ctober	1,770	241	353	.827				
November		408	643	1.51	1			
December		380	594	1.39	1			
The year	5,500	241	674	1.58	21			
1922 anuary	4,800	330	984	2.30	2			
ebruary		. 535	1,180	2.76	2			
larch		695	1,630	3.82	4			
pril	1	610	1,120	2.62	2			
Iay		510	1,210	2.83	3			
une		300	516	1.21	1			
uly		370	579	1.36	1			
ugust		205	267	.625				
eptember		150	180	.422				
October		135	234	.548				
November		135	176	.412				
December		168	690	1.62	1			
The year	4,800	135	731	1.71	23			
1923								
anuary		364	988	2.31	2			
ebruary		394	1,490	3.49	3			
[arch		475	1,450	3.40	3			
pril		436	592	1.39	1.			
Iay		. 485	1,020	2.39	2.			
une		485	804	1.88	2.			
uly		338	776	1.82	2.			
ugust		374	671	1.57	. 1.			
eptember		270	364	0.852	0.			
October		226	262	0.614	0.			
November		231	279	0.653	0.			
December	. 1,300	305	522	1.22	1.			
The year	4,600	226	768	1.80	24.			

WATAUGA RIVER NEAR ELIZABETHTON, TENN.

Location. At Virginia and Southwestern Railway bridge at Siam, 4 miles east of Elizabethton, Carter County, and 5 miles above mouth of Doe River.

Drainage Area. 475 square miles (measured on topographic maps). Records Available. February 10, 1903 to December 31, 1908, when station was discontinued.

GAGE. Chain gage fastened to downstream guard rail in middle span of bridge. DISCHARGE MEASUREMENTS. Made principally from railroad bridge. Also made from boat above gage. Some measurements apparently made at another section, possibly at highway bridge one-fourth of a mile downstream.

Channel and Control. Channel is straight for 1,000 feet above and below gage. Right bank high and subject to overflow at flood stages; left bank is abutment of bridge. Bed even and consists of sand and rocks. Control probably a shoal

1,000 feet downstream.

EXTREMES OF DISCHARGE. Maximum stage recorded, 8.4 feet July 12, 1905 (discharge, 10,100 second-feet); minimum stage, 1.05 feet January 6 and October 20 to November 2, 1904 (discharge, 148 second-feet).

ICE. Stage-discharge relation not affected by ice.

REGULATION. No information.

Accuracy. Stage-discharge relation not permanent. Two rating curves used, as follows: May 11, 1903 to July 11, 1905, well defined between 150 and 3,000 second-feet; July 12, 1905 to December 31, 1908, well defined between 500 and 3,000 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table except as indicated in footnote to daily-discharge table. Records good, except for days of estimated discharge.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF WATAUGA RIVER NEAR ELIZABETHTON, TENN.

		Year									
Week	1903	1904	1905	1906	1907	1908					
1		180	444	1,086	1,280	1,27					
2		221	125	816	702	3,10					
3		297	764	1,070	531	1,43					
4		565	546	3,940	483	1,08					
5		273	370	1, 241	417	88					
6		488	800	756	430	79					
7		317	1,281	699	4,00	3,2					
8		534	1,791	836	591	99					
9		835		742	1,334	1,4					
0		1	1,061			1,70					
		1,739	1,173	1,164	1,337						
1		730	952	959	1,174	1,4					
2		1,886	576	1,019	695	1,5					
3		1,258	476	1,201	526	1,1					
4		572	747	973	569	2,2					
5		584	1,180	1,169	873	7:					
6		490	655	1,458	933	1,1					
7		584	541	695	1,150	1,7					
8		1,186	701	971	739	8					
9		1,374	1,666	1,334	624	1,0					
0	. 596	872	3,271	537	431	9					
1	489	576	1,013	420	447	9					
2	513	850	551	469	1,606	9					
3	823	688	399	368	1,893	8					
4	552	455	375	1,449	1,939	8:					
5	436	395	706	890	1,051	7:					
6	538	625	480	751	971	7					
7	489	597	599	439	500	1,5					
8	796	387	3,392	671	821	1,0					
9	446	286	1,157	911	888	5					
0	316	423	761	876	640	8					
1	530	611	1,779	1,086	534	9:					
2	415	524	2,786	612	512	5					
3	301	590	1,890	1,341	472	3.					
4	251	439	918	989	536	9					
5	231	332	712	3,753	457	8					
6	218	344	551	2,206	495	4					
7	251	247	448	1,192	615	3					
8	306	203	415	1,904	1,060	2					
9											
0	202	185	325	1,781	2,117	2.					
1	171	179	321	2,547	719	18					
	250	165	329	799	457	5					
2	215	160	322	2,346	364	20					
3	188	148	333	1,185	298	1,55					
4	194	159	306	586	391	1,55					
5	250	240	290	502	451	57					
6	299	308	240	633	574	58					
7	252	289	240	2,636	700	56					
8	205	250	247	695	863	52					
9	208	439	1,022	551	435	1,78					
0	213	355	871	460	742	1,12					
1	289	264	946	674	1,228	84					
2	358	398	674	1,605	2,416	1,46					

MONTHLY DISCHARGE OF WATAUGA RIVER NEAR ELIZABETHTON, TENN.
[Drainage area, 475 square miles]

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1000					
1903	1				
May	680	440	543	1.14	0.89
June	1,280	355	587	1.24	1.38
July	1,600	275	500	1.05	1.21
August	835	205	354	.745	.86
September	570	185	244	.514	.57
October	470	165	204	.429	.49
November	835	185	248	.522	.58
December	718	165	266	.560	.65
1904	1 000	=====	010	0.50	
January	1,380	148	310	.653	.75
February	1,100	205	479	1.01	1.09
March	4,570	605	1,310	2.76	3.18
April	920	382	572	1.20	1.34
May	2,460	470	953	2.01	2.32
June	1,600	328	603	1.27	1.42
July	1,280	250	429	.903	1.04
August	1,190	300	514	1.08	1.24
September	470	185	254	.535	.60
October	185	148	162	.341	.39
November.	355	148	260	.547	.61
December	920	228	357	.752	.87
The year	4,570	148	517	1.09	14.85
1905			710	1.50	+ 70
January	2,460	355	712	1.50 2.40	1.73 2.50
February	2,850	250	1,140		
March	1,710	410	827	1.74	2.01
April	1,600	410	765	1.61 3.28	1.80 3.78
May	5,200	535	1,560	1 1 1 1 1 1 1 1 1 1	1.16
June	1,190	355	494	1.04	
JulyAugust	10,100	410	1,550	3.26	3.76 3.88
	3,820	525	1,600	3.37	
September	595	2,00	438	.922	1.03
October	400	290	326	.686	79
November	290	240	258	.543	.61
December	3,250	240	832	1.75	2 .02
The year	10,100	240	875	1.84	25.07
January	8,260	460	1,700	3.58	4.13
February	1,280	595	804	1.69	1.76
March	2,120	525	1,030	2.17	2.50
April	4,270	560	1,070	2.25	2.51
May	2,230	345	786	1.65	1.90
June	2,230	345	830	1.75	1.95
July	1,680	345	731	1.54	1.78
August	7,200	460	1,540	3.24	3.74
September	4,270	525	1,810	3.81	4.25
October	5,840	595	1,610	3.39	3.91
November	7,540	460	1,080	2.27	2.53
December	3,390	460	829	1.75	2.02
	,				
The year	8,260	345	1,152	2.42	32.98
					1

MONTHLY DISCHARGE OF WATAUGA RIVER NEAR ELIZABETHTON, TENN.-Continued

		t			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907					
January	2,120	400	716	1.51	1.74
February	1,470	400	555	1.17	1.22
March.	1.780	492	1,000	2.11	2.43
April		460	864	1.82	2.03
May		345	530	1.12	1.29
June		595	1,670	3.52	3.93
July	1,890	400	706	1.49	1.72
August	670	290	494	1.04	1.20
September		400	1.030	2.17	2.42
October	1,180	290	457	.962	1.11
November	1,180	290	609	1.28	1.43
December	3,530	400	1,210	2.55	2.94
The year	5,040	290	820	1.73	23 .46
1908					
January	9,530	830	1,680	3.54	4.08
February		595	1,430	3.01	3.25
March		830	1,580	3.33	3.84
April		670	1,460	3.07	3.42
May		670	965	2.03	2.34
June		525	774	1.63	1.82
July		400	1,050	2.21	2.55
August		290	652	1.37	1.58
September.		195	362	.762	.85
October		175	773	1.63	1.88
November		400	623	1.31	1.46
December	4,880	400	1,270	2.67	3.08
The year	9,530	175	1,051	2.21	30.15

DOE RIVER AT VALLEY FORGE, TENN.

LOCATION. At concrete highway bridge 50 feet below East Tennessee and Western North Carolina Railroad bridge at Valley Forge, Carter County. It is one-fourth of a mile from the railroad station and 4 miles above mouth of river. Laurel Creek enters 4 miles above. In 1911-1915, gage was at railroad bridge.

Drainage Area. 132 square miles (measured on top ographic maps).

Records Available. December 9, 1911 to September 30, 1916, and November 5, 1920 to December 31, 1923.

GAGE. Chain gage attached to parapet wall on downstream side of highway bridge, during 1920-1922; read by R. M. Snyder. During 1911-1915, chain gage attached to upstream side of railroad bridge.

Both gages set to same datum, but

read differently due to slope of river between.

DISCHARGE MEASUREMENTS. Made from either highway or railroad bridge, or by wading.

CHANNEL AND CONTROL. Bed composed principally of coarse gravel; smooth and uniform. Channel straight for 500 feet above and below gage; right bank is low and is overflowed at stage of about 5 feet; left bank is high and not subject to overflow. Control is gravel riffle 200 feet downstream; probably shifts during high water.

Extremes of Discharge. Maximum stage recorded, 5.9 feet during afternoon of July 20, 1921 (discharge 4,080 second-feet); minimum discharge, 35 second-feet November 24, 1014 (green beight, 0,00 feet)

fect November 24, 1914 (gage height, 0.90 foot).

ICE. Stage-discharge relation affected by ice during severe winters only.

Accuracy. Stage-discharge relation practically permanent. Two rating curves used as follows: December 11, 1911 to September 30, 1916, fairly well defined below 700 second-feet and extended beyond; November 5, 1920 to December 31, 1923, well defined below 800 second-feet and extended beyond to pass through a slope-discharge determination at 5,040 second-feet. Curves merge at 1,420 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF DOE RIVER AT VALLEY FORGE, TENN.

					Yea	ar				
Week	1911	1912	1913	1914	1915	1916	1920	1921	1922	1923
1		145	157	90	264	432		194	135	492
2		123	164	117	327	432		379	204	177
3		110	173	113	464	189		364	577	257
4		106	408	200	346	340		255	499	448
5		229	298	252	381	423		303	206	834
6		122	177	327	270	310		609	378	597
7		129	161	154	213	180		396	647	735
8		248	165	335	223	226		349	295	291
9		356	369	208	194	320		244	394	227
10		331	197	211	179	407		206	459	537
		728	1,274	539	161	250		190	631	802 484
12	•	315 561	330 999	285 370	163 224	389 733		190 224	322 336	271
14		538	237	305	204	395		241	332	230
15		211	298	284	274	313		158	275	205
16		222	322	516	163	216		326	420	203
17		399	210	253	153	183		266	439	186
18		512	241	189	239	142		638	389	196
19		282	163	189	279	114		399	292	241
20		246	183	132	169	101		232	420	353
21		172	598	97	180	130		212	283	237
22		284	516	83	150	167		166	198	271
23		173	325	75	129	109		156	191	198
24		224	186	65	138	167		143	171	198
25		178	127	83	118	130		200	150	157
26		147	96	40	89	83		136	154	183
27		204	126	90	156	115		121	266	271
28		204	88	94	141	446		236	229	223
29		313	81	86	178	1,175		670	261	517
30		251	81	88	108	325		259	182	180
31		145	111	79	88	167		411	202	215
32		108	155	- 59	67	241		266	138	308
33		89	87	111	169	610		409	114	540
34		132	86	105	169	178		266	120	449
35		85	127	284	141	113		183	92	213
36		92	81	71	306	103		135	93	162
37		71	64	85	145	112		109	68	136
38		95	142	60	100	75		109	61	172
39		117	101	57	76	73		121	61	115
40		76	71	50	133			120	59	92
41		67	62	48	91			92	164	83
42		77	90	320	90			85	78	80
43		68	117	74	79			77	75	101
44		66	78	62	68			350	67	83
45		150	103	73	66		100	151	66	98
46		87	171	74	151		220	185	82	78
47		75	120	64	209		159	159	70	92
48		79	95	272	160		139	299	79	101
49		109	106	496	98		289	270	211	125
50	84	79	85	160	123		483	144	365	142
51	126	70	83	176	783		216	142	400	150
52	240	104	105	576	502		255	163	146	239

MONTHLY DISCHARGE OF DOE RIVER NEAR VALLEY FORGE, TENN.
[Drainage area, 132 square miles]

		Discharges in	Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1911	an in a more greature				
December	344	73	157	1.19	1.37
1912					= =====================================
January	419	47	138	1.05	1.21
February	858	107	214	1.62	1.75
March.	1,600	190	449	3.40	3.92
April	6,170	167	369	2.80	3.12
May	558	146	286	2.17	2.50
June	500	112	186	1.41	1.57
July	652	134	236	1.79	2.06
August	216	77	111	.841	.97
September	197	63	92	.697	.78
October	102	60	71	.538	.62
November	344	57	94	.712	.79
December	197	41	91	.689	.79
The year.	1,600	41	195	1.48	20.02
1913	786	95	243	1.84	2.12
JanuaryFebruary	718	90	243	1.54	1.58
		158	664	5.03	5.80
March	446	164	273	2.07	2.3
April May	1,330	131	343	2.60	3.00
June	528	88	200	1.52	1.70
July		57	92	.697	.80
August		57	118	.894	1.0
September		57	96	.727	.8
October		55	85	.644	.7
November	344	69	115	.871	.9
December		63	97	.735	.8
The year	3,600	55	2,11	1.60	21.7
1914	410	10	100	1.07	
January	446	46	139	1.05	1.2
February		61	271	2.05	2.1
March	1,170	102 167	325 339	2.46	2.8
April				2.57	
May	227	83	141 68	1.07	1.2
June		37	88	.667	.5
July		49	131	.992	1.0
AugustSeptember		49	71	.538	1.0
October		49	117	.886	1.0
November		35	82	.621	.6
December		70	374	2.83	3.20
The year	1,250	35	179	1.35	18,24

MONTHLY DISCHARGE OF DOE RIVER NEAR VALLEY FORGE, TENN.—Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1915					
January	588	149	336	2.55	2.94
February	752	164	273	2.07	2.16
March	267	120	180	1.36	1.57
April	394	123	202	1.53	1.71
May	446	102	201	1.52	1.75
June	246	75	126	.955	1.07
July	368	67	141	1.07	1.23
August	394	58	131	.992	1.14
September	786	67	154	1.17	1.31
October	187	65	96	.727	.84
November	500	65	138	1.05	1,17
December	2,640	36	364	2.76	3.18
The year	2,640	36	195	1.48	20.07
1916					=======
January	858	120	336	2.55	2.94
February	752	120	284	2.15	2.32
March.	1,170	187	437	3.31	3.82
April		146	282	2.14	2.39
May	L.	88	131	.992	1.14
June	250	71	124	.939	1.05
July	2,300	67	480	3.64	4.20
August	1,880	102	277	2.10	2.42
September 1920	267	52	92	.697	.78
November 5-30	562	88	155	1.17	1.31
December	1,180	138	298	2.26	2.61
1921					
January		168	301	2.28	2.63
February	1,690	230	407	3 .08	3.21
March.	265	162	200	1.52	1.75
April	590	144	256	1.94	2.16
May		168	346	2.62	3.02
June		120	160	1.21	1.35
July	1,510	97	304	2.30	2.65
August		125	325	2.46	2.84
September	192	92	123	.932	1.04
October	740	74	124	.939	1.08
November	390	130	202	1.53	1.71
December	435	125	191	1.45	1.67
The year	1,690	74	245	1.86	25.11

MONTHLY DISCHARGE OF DOE RIVER NEAR VALLEY FORGE, TENN .- Continued

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1922		-			
January	1,510	120	340	2.58	2.97
February	1,420	202	383	2.90	3.02
March	1,110	248	449	3.40	3.92
April	865	230	372	2.82	3.15
May	800	177	321	2.43	2.80
June	248	112	172	1.30	1.45
July	412	135	234	1.77	2.04
August	192	80	128	.970	1.12
September	125	59	72	.545	.6:
October	368	55	91	.689	.79
November	132	63	71	.538	.60
December	900	97	265	2.01	2.32
The year	900	55	241	1.83	24.79
1923 January	1,340	141	383	2.90	3.34
February	1,510	216	561	4.25	4.43
March	1,600	198	493	3.73	4.30
April	285	168	207	1.57	1.7
May	650	162	265	2.01	2.3
June	265	138	189	1.43	1.60
July	1,690	144	287	2.17	2.50
August	1,690	168	366	2.77	3.19
September	368	106	147	1.11	1.24
October	132	76	89.2	.676	.78
November	138	72	90	.682	.76
December	390	88	163	1.23	1.45
The year	1,690	72	270	2.04	27.63

NOLICHUCKY RIVER NEAR EMBREEVILLE, TENN.

LOCATION. At county highway bridge at Embreeville, Washington County, 3½ miles northwest of Erwin, and 14 miles southwest of Johnson City. North Indian Creek enters at Erwin and South Indian Creek 1½ miles farther up-

Drainage Area. 795 square miles (measured on topographic maps).

Brecords Available. July 1, 1920 to December 31, 1923.

Gage. Chain gage bolted to downstream railing of bridge; read by James Ammons.

Discharge Measurements. Made from downstream side of bridge.

Channel and Control. Control solid rock and gravel shoal 600 feet below gage; shifts occassionally. Both banks wooded; right bank steep and high; left bank

subject to overflow above stage of about 15 feet.

Extremes of Discharge. Maximum stage recorded, about 11.0 feet at noon August 3, 1921 (discharge not determined); minimum stage, 2.09 feet mean for day November 14, 1923 (discharge, 315 second-feet).

ICE. Stage-discharge relation slightly affected by ice during average winters.

REGULATION. None.

ACCURACY. Stage-discharge relation not permanent. Two rating curves used as follows: July 1, 1920 to February 9, 1921, fairly well defined below 2,000 second-feet and extended above; February 10, 1921 to September 30, 1923, well defined below 5,000 second-feet and extended above. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as indicated in footnote to daily-discharge table. Records good for medium and low stages; records above 5,000 secondfeet subject to error on account of extension of rating curve.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF NOLICHUCKY RIVER NEAR EMBREEVILLE, TENN.

	Year							
Week	1920	1921	1922	1923				
1		938	721	0.90				
				2,38				
3		1,448	940	1,00				
		1,673	2,970	99'				
4		1,350	2,829	2,34				
5		1,779	1,227	3,63				
6		3,821	1,987	3,04				
7		2,586	3,761	2,98				
8		2,313	1,687	1,39				
9		1,487	2,330	1,22				
10		1,204	2,947	2,98				
11		1,116	3,450	4,32				
12		1,273	1,979	2,79				
13		1,417	2,767	1,54				
14		1,367	2,499	1,35				
15		972	1,820	1,38				
16		2,846	2,239	1,39				
17		1,913	2,107	1,24				
18		2,884	2,203	2,16				
19		2,093	1,776	21,5				
20		1,413	2,156	2,26				
21		1,534	1,871	2,68				
22		1,139	1,510	2,92				
23		1,096	1,626	1,62				
24		1,044	1,270	1,22				
25		973	1,291	1,07				
26		911	953	1,07				
27	948	748	1,430	1,21				
28	690	1,537	1,441	1,08				
29	638	3,170	1,831	2,60				
30	470	1,763	1,376	1,15				
31	550	2,679	926	1,11				
32	1,569	1,719	699	1,59				
33	1,571	3,831	681	1,63				
34	1,590	1,829	779	1,18				
35	1,343	1,109	652	71				
36	875	838	559	76				
37								
	1,994	813	441	56				
38	1,229	776	410	60				
39	997	694	423	57				
40	765	746	403	46				
41	559	574	1,031	44				
42	505	549	490	370				
43	533	494	544	414				
44	526	1,898	418	40:				
45	490	941	394	403				
46	1,056	946	390	345				
47	779	964	378	420				
48	816	1,574	385	550				
49	1,381	1,579	786	1,008				
50	2,796	835	1,670	975				
51	1,420	1,097	2,541	920				
		907	735	1,135				

Monthly Discharge of Nolichucky River at Embreeville, Tenn.
[Drainage area, 795 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inche
1920					
uly	2,640	405	732	0.921	1.
ugust	2,290	432	1,410	1.77	2.
eptember.	3,470	730	1,250	1.57	1.
ctober	1,030	449	586	.738	-:
lovember	2,700	432	744	.936	1.
December	7,860	715	1,690	2.13	2.
1921 anuary	3,100	781	1,400	1,77	2.
ebruary	9,260	1,240	2,600	3.27	3.
Iarch	1,750	972	1,240	1.56	1.
pril	6,820	860	1,800	2.26	2.
[ay	4,570	1,120	1,890	2.38	2.
une	1,780	774	1,010	1.27	1.
uly	5,720	692	1,740	2.19	2.
ugust	6,020	840	2,370	2.98	3.
eptember	1,230	593	798	1.00	1.
ctober	2,620	463	711	.894	1
lovember	2,900	755	1,180	1.48	1.
December	2,620	536	1,140	1.43	1.
The year	9,260	463	1,490	1.87	25.
anuary	8,880	585	1,810	2.28	2.
ebruary	7,850	1,120	2,170	2.73	2
farch	5,890	1,520	2,810	3.53	4
pril	3,820	1,460	2,210	2.78	3
Iay	4,140	1,170	1,900	2.39	2
une	2,330	850	1,340	1.68	1
uly	2,190	1,000	1,480	1.86	2
ugust	1,170	550	736	.926	1
eptember	625	362	465	.585	
ctober	2,900	352	601	.756	
Vovember	508 4,140	330 374	383 1,350	1.70	1
The year	8,880	330	1,438	1.81	24
1923		=====	1,400	1.01	24.
anuary	5,520	755	1,830	2.30	2
ebruary	4,980	1,120	2,560	3.22	3.
[arch	7,050	1,060	2,740	3.45	3.
pril	2,050	1,060	1,350	1.70	1.
[ay	4,980	1,120	2,510	3.16	3.
une	2,050	950	1,330	1.67	1.
uly	5,520	950	1,470	1.85	2.
ugust	2,190	585 463	1,290	1.62	1.
eptember	950 500	326	637 419	0.801 0.527	0.
October	645	315	419	0.527	0.
November December	1,730	468	982	1.23	1.
The year.	7,050	315	1,462	1.84	25.

NOLICHUCKY RIVER NEAR GREENEVILLE, TENN.

At Jones highway bridge, half a mile below Camp Creek, 5 miles south east of Greeneville, Greene County, and 9 miles above power plant of Tennessee Eastern Electric Company.

Drainage Area. 1,100 square miles (measured on topographic maps).

RECORDS AVAILABLE. May 9, 1903 to December 31, 1908; April 7, 1919 to December 31, 1923.

Gage. Chain gage used, 1903-1908, was bolted to upstream side of bridge; that used 1919-1923, fastened to downstream side. Datum of latter gage is 2.04 feet lower than that of original gage.

DISCHARGE MEASUREMENTS. Made from downstream side of highway bridge.

CHANNEL AND CONTROL. Bed composed of gravel and rock; somewhat shifting.

Right bank high but subject to overflow at extreme flood stages; left bank not subject to overflow. Channel straight for 700 feet above and below station. Control is formed by well-defined gravel and rock riffle 50 feet below gage; fairly permanent.

Extremes of Discharge. Maximum stage recorded, 19.3 feet (original datum), crest stage during early morning January 23, 1906 (discharge not determined); minimum stage recorded,—0.15 foot (original datum), October 23, 1904 (dis-

charge, 305 second-feet).

ICE. Stage-discharge relation not affected by ice.

Regulation. Probably negligible.

Accuracy. Stage-discharge relation not permanent; three rating curves used, well defined between 500 and 9,000 second-feet and extended above. One curve used 1903-1908, another used 1919-1923. Gage read to half-tenths once daily; more frequently during extreme high water. Daily discharge ascertained by applying gage height to rating table. Records good except for extremely high stages, for which they are fair.

MEAN WEEKLY DISCHARGE IN SECOND-FEET OF NOLICHUCKY RIVER NEAR GREENEVILLE, TENN.

						Year					
Week	1903	1904	1905	1906	1907	1908	1919	1920	1921	1922	1923
1		522	1,143	2,391	2,910	2,710		675	1,737	1,033	3,259
2		562	2,616	1,480	1,711	6,089		809	2,649	1,178	1,520
3		693	1,660	1,951	1,410	2,609		1,201	2,957	4,611	1,681
4		1,036	879	9,723	1,174	1,810		2,711	2,146	6,033	2,870
5		616	885	3,367	1,150	1,400		2,489	2,943	1,791	6,034
5 7		1,300	2,286	1,953	1,441	1,720		2,153	6,384	2,541	5,087
		803 1,322	2,229 4,550	1,857 1,781	1,063 983	6,104 2,379		1,339 2,086	4,249 3,271	5,871 2,810	6,076 2,106
		2,188	2,281	1,933	2,446	2,518		1,925	2,219	3,324	1,687
10		3,513	2,346	1,827	2,391	3,097		1,984	1,824	5,604	4,421
11		1,811	2,160	1,516	2,643	3,133		6,184	1,639	5,929	7,850
12		3,857	1,541	2,286	1,597	4,431		3,966	1,779	3,396	4,714
13		3,113	1,270	2,521	1,204	2,844		3,333	1,977	3,926	2,591
14		1,621	1,489	2,080	1,447	2,330		11,989	2,083	3,316	1,904
15		1,363	3,183	3,044	1,920	1,841	1,929	2,961	1,283	2,456	1,931
16		1,331	1,601	2,749	1,814	2,363	2,037	1,970	4,684	2,827	1,954
17		1,917	1,253	1,491	2,407	3,647	1,507	1,890	2,427	3,244	1,663
18	2,500	1,961	1,461	2,651	2,010	2,011	2,034	1,581	3,599	3,364	2,346
19	2,016	2,876	3,633	2,906	2,207	2,190	1,933	1,373	2,780	2,961	2,221
20	1,737	1,431	4,701	1,390	1,351	1,839	1,711	1,201	1,780	3,239	3,334
21	1,281 2,080	1,041	2,176	1,086	1,101	2,051	2,117	1,187	1,931	2,584	3,326
23	2,859	1,741 1,288	1,834 1,012	1,316 974	2,421 3,826	2,117 1,503	2,214 1,211	1,034 2,031	1,397 1,181	2,034 2,493	4,463 2,097
24	1,871	973	1,420	2,850	3,049	1,904	1,080	1,012	1,210	2,493	1,587
25	1,320	997	2,526	1,594	1,541	1,350	1,627	1,769	1,186	2,219	1,693
26	1,128	1,626	1,176	1,593	1,719	1,020	3,111	1,099	1,220	1,291	1,723
27	1,011	.970	1,846	1,171	1,266	2,630	1,287	1,529	988	1,717	1,947
28	1,349	1,028	5,247	1,103	1,595	2,049	1,071	926	1,564	2,334	1,326
29	992	708	2,701	2,613	1,949	1,029	2,754	911	6,260	2,187	3,503
30	748	869	1,654	1,971	1,035	1,251	1,639	682	2,337	1,576	1,191
31	1,214	1,101	1,309	2,563	1,196	1,349	1,366	786	5,911	1,213	2,130
32	924	1,134	3,039	1,613	1,033	1,506	1,045	2,345	2,467	908	2,578
33	962	956	3,537	2,749	809	870	1,188	2,697	6,740	9.27	1,814
34	779	1,131	1,669	2,159	1,112	2,871	762	2,577	2,601	1,087	1,649
35 36	580 531	729 779	1,141	5,603	848	2,093	861	1,937	1,413	887	1,104
37	533	532	969 808	4,037 2,053	857 858	1,084 836	567 569	1,276 3,276	1,139 1,057	746 568	1,045 917
38	658	449	709	6,081	1,568	683	586	2,150	978	519	1,059
39	449	415	612	3,304	2,226	639	556	1,427	928	553	952
40	421	362	676	5,181	1,179	605	493	1,115	909	474	626
41	590	372	761	2,380	902	1,114	669	847	738	1,157	584
42	448	340	644	3,539	734	690	923	726	703	649	529
43	411	340	724	2,327	676	3,973	1,011	648	631	648	686
44	406	372	651	1,501	716	3,374	661	767	2,112	550	679
45	468	569	612	1,213	728	1,431	564	655	1,111	551	836
46	813	669	562	1,304	771	1,461	713	1,400	1,217	580	689
47	685	619	575	7,567	1,492	1,214	520	1,074	1,207	526	1,049
48		550	568	1,891	1,320	1,107	620	1,121	1,850	528	1,483
49		1,087	2,368	1,480	849	2,659	779	2,097	1,984	1,331	1,270
51	771	770 607	1,967 1,607	1,451 1,850	1,600	2,523	3,074 1,287	4,599	1,104	2,167	1,179 1,289
52		1,037	1,678	3,714	2,396	2,259 2,664	859	1,997 2,159	1,312 1,103	3,750 1,533	1,289
	000	1,001	1,010	0,714	2,090	2,001	009	2, 109	1,100	1,000	1,000

MONTHLY DISCHARGE OF NOLICHUCKY RIVER NEAR GREENEVILLE, TENN. [Drainage area, 1,100 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inche
1903					
May		1,070	1,790	1.63	1.
June	5,180	1,070	1,960	1.78	1.
Tuly	2,620	670	1,030	.936	1.
August	1,480	580	894	.813	
September	1,200	415	545	.495	
October	855	378	460	.418	
November	2,440	415	594	.540	
December	1,340	408	598	.544	
1904					
anuary	1,480	447	702	.638	
February	3,550	538	1,240	1.13	1.
Iarch	10,000	1,410	2,960	2.69	3
pril	3,550	1,140	1,610	1.46	1
lay	6,760	905	1,690	1.54	1
une	3,170	760	1,360	1.24	1
uly	1,930	580	923	.839	
ugust	2,100	625	1,040	.945	1
eptember	1,010	415	557	.506	
ctober	415	305	355	.323	
lovember	905	340	572	.520	
December	2,020	495	863	.785	
The year	10,000	305	1,156	1.05	14
anuary	7,480	625	1,510	1.37	1
ebruary.	7,970	760	2,680	2.44	2
[arch	3,940	1,200	1,870	1.70	1
pril	4,550	1,070	1,850	1.68	1
lay	7,970	1,200	2,930	2.66	3
une	5,400	855	1,530	1.39	1
uly	13,100	1,010	2,730	2.48	2
ugust	8,470	1,010	2,240	2.04	2
eptember	1,200	580	790	.718	
ctober	1,200	580	701	.637	
lovember	670	538	584	.531	
ecember	6,070	580	1,820	1.65	1
The year	13,100	538	1,769	1.61	21
1906 anuary	40,400	905	3,870	3.52	4
ebruary	3,940	1,480	2,040	1.85	1
arch	5,620	1,340	2,220	2.02	2
pril	10,000	1,270	2,330	2.12	2
ay	5,400	955	1,960	1.78	2
ine	6,300	855	1,710	1.55	1
uly	2,980_	855	1,690	1.54	1.
ugust	11,100	1,140	2,920	2.65	3.
eptember	19,400	1,480	3,900	3.55	3.
ctober	8,470	1,550	3,190	2.90	3.
ovember	23,300	1,140	2,870	2.61	2.
December	8,220	1,140	2,150	1.95	. 2

MONTHLY DISCHARGE OF NOLICHUCKY RIVER NEAR GREENEVILLE, TENN.—Continued

		Discharges in	Second-feet	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907				201	
January	4,760	1,010	1,720	1.56	1.80
February	2,020	905	1,260	1.15	1.20
March	4,760	1,140	2,090	1.90	2.19
April	3,550	1,070	1,880	1.71	1.91
May	2,980	905	1,560	1.42	1.64
June	6,530	1,200	2,750	2.50	2.79
July	3,550	905	1,490	1.35	1.56
August	1,480	670	969	.881	1.02
September	6,070	670	1,330	1.21	1.38
October	1,770	670	853	.775	.89
November	2,620	670	1,040	.945	1.08
December	5,400	760	1,510	1.37	1.58
December				1.07	1.00
The year	6,530	670	1,538	1.40	18.98
January	22,100	1,340	3,130	2.85	3.29
February	9,760	1,200	2,890	2.63	2.84
March	7,480	2,270	3,400	3.09	3.56
April	10,000	1,410	2,530	2.30	2.57
May	3,360	1,480	2,080	1.89	2.18
June	3,550	855	1,470	1.34	1.50
July	8,220	855	1,720	1.56	1.80
August	11,400	808	1,720	1.60	1.84
September	1,340	580	841	.765	.88
October	15,200	538	1890	1.72	1.98
November	3,170	955	1,450	1.32	1.4
December	5,400	1,270	2,460	2.24	2.58
The year	22,100	538	2,135	1.94	26.40
1919					
April 7-30	2,770	1,310	1,810	1.65	1.4
May	3,350	1,450	2,040	1.85	2.13
June	4,240	940	1,740	1.58	1.76
July	4,600	885 625	1,670	1.52	1.7
August	2,070	0_0	1,040	.946	1.09
September	940	385 385	592 763	.538	.60
October November	1,600	420	603	.694	.6:
December 1920	6,860	580	1,430	1.30	1.50
January	5,220	495	1,420	1.29	1.49
February	6,300	1,060	2,030	1.85	2.00
March	11,300	1,450	3,600	3.27	3.77
April	33,800	1,600	4,550	4.14	4 .62
May	1,680	1,000	1,290	1.17	1.35
June	3,150	830	1,440	1.31	1.46
July	3,560	625	997	.906	1.04
August	3,900	625	2,200	2.00	2.31
September		1,060	2,000	1.82	2.0
October -	1,310	535	833	.757	.8'
November.	3,670	535	1,010	.918	1.05
December	11,300	1,120	2,590	2.35	2.71
The year	33,800	495	1,997	1.82	24.6

MONTHLY DISCHARGE OF NOLICHUCKY RIVER NEAR GREENEVILLE, TENN.—Continued

		Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1001	7				
1921	5,220	1 450	0.400	0.00	2
Tanuary	15,800	1,450 2,240	2,420 4,160	2.20 3.78	3.9
March	2,500	1,380	1,810	1.65	1.
April	14,900	1,180	2,620	2.38	2.0
Лау	6,720	1,380	2,390	2.38	2.
une	1,600	940	1,200	8.09	1.
ulv	14,600	830	2,660	2.42	2.
	100.00			3.76	4.
August	16,100	1,310	4,140		
September	1,260	874	1,040	.945	1.
October	4,360	625	864	.785	
November	3,060	896	1,430	1.30	1.
December	3,150	896	1,400	1.27	1.
The year	16,100	625	2,178	1.98	26.
anuary	14,000	809	3,090	2.81	3.
February	10,700	1,680	3,270	2.97	3
Iarch	7,150	1,990	4,650	4.23	4
pril	7,730	2,070	3,050	2.77	3
Iay	4,240	1,600	2,840	2.58	2
une	3,350	1,120	2,110	1.92	2
uly	1,830	778	1,880	1.71	1
August	725	725	998	.907	1
September	455	455	603	.548	
October	1,910	441	715	.650	
November	725	427	540	.491	
December	9,800	625	2,070	1.88	2
The year	14,000	427	2,151	1.96	26
1923					
anuary	8,900	1,240	2,620	2.38	2
ebruary	10,700	1,520	4,440	4.04	4
Iarch	17,900	1,520	4,580	4.16	4
pril	2,550	1,490	1,890	1.72	1
Iay	12,100	1,560	3,150	2.86	3
une	3,700	1,350	1,930	1.75	1
uly	10,000	790	1,940	1.76	2
ugust	3,290	1,020	1,930	1.75	2
eptember	2,030	670	991	.901	1
October	760	506	611	.555	
November	2,300	640	894	.813	
December	2,830	760	1,420	1.29	1.
The year	17,900	506	2,200	2.00	27.

NORTH TOE RIVER AT SPRUCE PINE, N. C.

- LOCATION. At county highway steel bridge at Spruce Pine, Mitchell County, 600 feet southwest of Carolina, Clinchfield and Ohio Railroad station, half a mile below mouth of Beaver Creek and 3 miles above mouth of Bear Creek.
- DRAINAGE AREA. 130 square miles (measured on topographic maps).

 RECORDS AVAILABLE. June 19, 1907 to June 30, 1908; April 21 to October 9, 1920;

 January 13, 1921 to December 31, 1923. Gage-height record only April 21 to October 9, 1920.
- Gage. Chain gage attached to floor on upstream side of highway bridge, installed February 1, 1921; read by G. A. Wilkie. Original gage used during 1907 and 1908 was a vertical staff located at a suspension footbridge which was probably at the site of the present bridge. Gage used April 21 to October 9, 1920, was a vertical staff fastened to rock ledge on left bank 50 feet above bridge. Datum
- unchanged since April 21, 1920.

 DISCHARGE MEASUREMENTS. Made from downstream side of bridge to which gage is attached.
- CHANNEL AND CONTROL. Bed of stream sandy and rough. Current not uniform across section; sluggish near left bank. Control is well-defined shoal 100 feet below gage; probably shifting. Right bank is overflowed during extreme high water; left bank is overflowed below bridge during high water.

 Extremes of Discharge. 1920-1923: Maximum stage recorded, 6.50 feet at
- 6 p.m. April 16, 1921 (discharge, 3,160 second-feet); minimum stage, 1.24 feet 6 a.m. November 28, 1922 (discharge, 55 second-feet).

 ICE. Stage-discharge relation may be slightly affected by ice for short periods.

 REGULATION. Small power plant upstream probably causes some diurnal fluc-
- tuation.
- URACY. Stage-discharge relation not permanent. Rating curves fairly well defined between 100 and 550 second-feet; peorly defined above 550 second-ACCURACY. feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair below 550 secondfeet; fair to poor above that point.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF NORTH TOE RIVER AT SPRUCE PINE, N. C.

Week	1907	1908	1920	1921	1922	1923
1					185	438
2		260			206	208
3		275		340	423	217
4				384	557	316
5				354	273	514
6				760	374	329
7				547	527	454
8				468	347	245
9				317	483	208
10				270	524	346
11				245	586	674
12				304	372	480
13				332	774	269
14				237	533	258
15		303		219	446	359
16				803	369	278
17	4			436	408	238
18				439	497	258
19		313		384	384	282
20		280		284	722	527
21		320		309	528	409
22		290		248	408	802
23		311		234	381	332
24		260		180	292	291
25	284	270		150	295	313
26	308	252		143	215	288
27	277			145	306	330
28	280			225	222	373
29	303			. 528	294	626
30	236			375	242	206
31	252			392	157	204
32	194			265	146	179
33	183			435	156	175
34	160			256	137	172
35	160			188	114	154
36	160			149	105	178
37	192			143	73	138
38	120			151	69	114 111
39	270			123	113	111
40	183			110	96 360	112
42	160			89		142
43	143			91	138 105	173
	131			88 726	77	197
45	166 120			242	75	228
46				222	71	208
47	131 231			241	66	216
48	166			281	76	337
49	160			270	210	382
50	100			198	311	267
51	214	,		253	464	267
52	260			217	363	284
	200			21	000	_01

Monthly Discharge of North Toe River at Spruce Pine, N. C. [Drainage area, 130 square miles]

minimized the same of the same		Discharges in	Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1921					
January 13-31	610	294	380	2.92	2.06
Fèbruary	1,550	294	530	4.08	4.0
March	534	222	287	2.21	2.5
April	1,480	175	420	3.23	3.6
May	558	222	343	2.64	3.0
June	396	111	183	1.41	1.5
July	837	88	304	2.34	2.70
August	778	140	321	2.47	2.88
September	294	99	144	1.11	1.24
October	1,840	77	178	1.37	1.58
November	958	193	280	2.15	2.40
December	462	178	241	1.85	2.13
January	1,410	166	334	2.57	2.9
February	610	276	384	2.95	3.0
March	1,340	314	572	4.40	5.0
April	837	333	443	3.41	3.80
May	1,480	276	516	3.97	4.58
June	584	190	314	2,42	2.70
July	440	178	259	1.99	2.2
August	184	109	142	1.09	1.2
September	294	61	90.7	.698	.73
October		63	165	1.27	1.4
November	78	58	69.3	.533	.5
December	1,210	67	324	2.49	2.8
The year	1,480	58	301	2.32	31.43
January	1,210	186	325	2.50	2.88
February	625	209	344	2.65	2.70
March	1,410	194	418	3.22	3.7
April	491	209	280	2.15	2.40
May	1,700	240	456	3.51	4.0
June	625	224	329	2.53	2.89
July	1,840	194	370	2.85	3.29
August		148	177	1.36	1.57
September		99	135	1.04	1.16
October	189	107	147	1.08	1.24
November	441	183	236	1.82	2.08
December	625	224	302	2.32	2.68
The year	1,840	99	293	2.26	30.65

FRENCH BROAD RIVER AT ROSMAN, N. C.

LOCATION. At highway bridge 800 feet west of railroad station at Rosman, Transylvania County. East Fork of French Broad River enters half a mile below.

Drainage Area. 66 square miles (measured on topographic maps).

Records Available. May 7, 1907 to June 30, 1909, when station was discontinued.

Gage. Vertical staff fastened to plank retaining wall on right bank just above bridge.

DISCHARGE MEASUREMENTS. Made from highway bridge at gage.

CHANNEL AND CONTROL. Both banks may be overflowed at high stages. Current

is good. Conditions of control not known.

Extremes of Discharge. Maximum stage recorded, 7.3 feet February 15, 1908 (discharge, 4,760 second-feet); minimum stage, 1.8 feet August 5, 7-10, September 7, 13-21, and October 25 and 26, 1907 (discharge, 90 second-feet).

ICE. No ice affect during period of record.

REGULATION. None.

Accuracy. Stage-discharge relation practically permanent. Rating curve well defined between 100 and 600 second-feet and fairly well defined between 600 and 2,500 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good. COOPERATION. Station established in cooperation with United States Forest Service.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF FRENCH BROAD RIVER AT ROSMAN, N. C.

		Year			Year			
Week 1907	907	1908	1909	Week	1907	1908	1909	
1		318	403	27	110	387	1,499	
2		495	234	28	126	209	819	
3		386	359	29	134	173	710	
4		308	242	30	140	182		
5		323	178	31	110	175		
6		241	304	32	102	203		
7		1,339	537	33	123	133		
8		446	817	34	138	607		
9		452	365	35	110	329		
0		317	375	36	107	309		
1		338	537	37	99	153		
2		527	817	38	299	133		
3		361	365	39	179	142		
4		255	375	40	141	129		
5		319	478	41	120	246		
6		386	449	42	110	133		
7		- 667	403	43	104	543		
8		436	241	44	171	438		
9	186	445	502	45	136	170		
0	164	381	328	46	162	208		
1	149	353	333	47	410	145		
2	251	261	486	48	196	173		
3	160	318	637	49	163	562		
4	141	279	600	50	490	209		
5	133	239	466	51	363	244		
6	129	218	826	52	445	246		

MONTHLY DISCHARGE OF FRENCH BROAD RIVER AT ROSMAN, N. C. [Drainage area, 66 square miles]

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run off in Inches
1907					
May 7-31	223	133	164	2.48	2.31
June	705	133	166	2.48	2.81
July	300	110	127	1.92	2.81
August		90	117	1.77	2.04
September	1,510	90	167	2.53	2.89
October -	1,510	90	118	1.79	2.00
November	1,000	110	229	3.47	3.87
December	1,510	110	355	5.38	6.20
1908	1,010	110	000	0.00	0.20
January	1,260	133	368	5.58	6.43
February	4,760	190	603	9.14	9.86
March	850	260	393	5.95	6.86
April	1,960	133	407	6.17	6.88
May	775	223	385	5.83	6.72
June	395	223	263	3.98	4.44
July	570	160	231	3.50	4.04
August		133	299	4.53	5.22
September	510	110	189	2.86	3.19
October	1,690	110	305	4.62	5.33
November	345	133	179	2.71	3.02
December	1,420	160	308	4.67	5.38
The year	4,760	110	328	4.96	67.37
1909					
January	850	190	299	4.53	5.22
February	1,340	133	484	7.33	7.63
March	1,340	260	415	6.29	7.25
April	1,600	190	357	5.41	6.04
May	2,560	260	551	8.35	9.63
June	4,180	190	882	13.4	14.95

FRENCH BROAD RIVER AT BLANTYRE, N. C.

Location. At highway bridge 700 feet east of Blantyre railroad station, Transylvania County, 3 miles downstream from mouth of Little River and 6 miles downstream from mouth of Davidson River.

Drainage Area. 296 square miles (measured on topographic map).

Records Available. December 11, 1920 to December 31, 1923.

GAGE. Chain gage attached to downstream side of bridge; read by Mrs. A. B. Osbourne.

DISCHARGE MEASUREMENTS. Made from upstream side of bridge. CHANNEL AND CONTROL. Channel straight for several hundred feet above and below gage. Bed composed of sand and gravel, somewhat shifting. Both banks steep and about 15 feet above zero of gage; subject to overflow which floods the wide cultivated bottom. Control apparently formed by a rock ledge across the river about 1 mile below gage.

Extremes of Discharge. 1920-1923: Maximum stage recorded, 15.95 feet at 8 a.m. May 30, 1923 (discharge, 6,000 second-feet); minimum stage recorded, 2.6 feet at 5 p.m. November 26, 1922 (discharge, 239 second-feet).

Ice. None.

REGULATION. Slight diurnal fluctuations noticeable during low water periods is probably due to operation of small mills on tributaries.

Accuracy. Stage-discharge relation fairly permanent. Rating curve well defined below 3,200 second-feet; extended above that point. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF FRENCH BROAD RIVER AT BLANTYRE, N. C.

		Year							
Week	1920	1921	1922	1923					
1		981	- 724	1,26					
2		1,393	1,163	59					
3		1,486		51					
4		999	1,359	72					
5 		994	1,731 1,121						
6		1,984	1,121	94					
7		1,566	1,829	1,16					
8		1,694	1,829	1,07					
		1,094		•					
9		921	1,613	71					
0 1		824	2,029 1,999	76					
2		927		2,15					
		893	1,501	1,48					
3		776	2,983	92					
<u> </u>			2,306	93					
(790	1,636	1,40					
		1,804	1,513	1,08					
		1,257	1,247	84					
		960	2,179	1,13					
		961	1,556	1,04					
		1,059	1,794	1,46					
		1,613	1,604	1,58					
		909	1,481	3,87					
		862	1,384	1,71					
		871	1,054	1,19					
		889	1,329	1,00					
		1,019	887	94					
*		744	979	84					
		844	859	69					
		1,133	1,033	85					
		835	1,063	59					
		888	712	71					
		928	584	78					
		1,029	561	65					
		1,038	468	55					
		764	410	61					
		608	383	62					
***************************************		554	371	56					
		747	330	95					
		965	346	64					
************************		732	347	44					
*		512	536	38					
		451	399	48					
		410	342	38					
		946	310	56					
***************************************		645	289	92					
		754	286	47					
		1,017	275	45					
***************************************		899	276	73					
		1,015	351	1,32					
		664	482						
	1 904	1,324	1,161	88					
	1,364	976	770	1,05					
	1,506	970	770	84					

Monthly Discharge of French Broad River at Blantyre, N. C. [Drainage area, 296 square miles]

		Discharges in	Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1920					
December 11-31	5,340	756	1,740	5.88	4 60
1921					=====
January	2,560	840	1,200	4.05	4.67
February	4,630	900	1,570	5.30	5.52
March	1,140	784	902	3.05	3.52
April	3,920	644	1,150	3.89	4.34
May	2,400	784	1,130	3.82	4.40
June	1,230	672	902	3.05	3.40
July	1,430	644	882	2.98	3.44
August	1,500	700	954	3.22	3.71
September		484	717	2.42	2.70
October	2,240	395	589	1.99	2.29
November	1,530	534	808	2.73	3.05
December	2,780	588	998	3.37	3.88
The year	4,630	395	984	3.32	44.92
1922	2.000		4 222		
January	3,600	700	1,220	4.12	4.75
February	2,970	1,020	1,380	4.66	4.85
March	5,280 3,760	1,230 1,170	2,090 1,690	7.06 5.71	8.14 6.37
April		1,110	1,740	5.88	6.78
June		870	1,230	4.16	4.64
July	1,710	756	970	3.28	3.78
August	1	395	538	1.82	2.10
September		294	360	1.22	1.36
October	930	275	397	1.34	1.54
November	313	239	283	.956	1.07
December	2,320	294	668	2.26	2.61
The year	5,280	239	1,047	3.54	47.99
1923				=====	
January	2,740	484	805	2.72	3.14
February		616	935	3.16	3.29
March	5,340	616	1,260	4.26	4.91
April	3,220	756	1,050	3.55	3.96
May	.,	756 784	1,780	6.01 4.73	6.93 5.28
July	3,870 1,430	534	1,400 738	2.49	2.87
August	1,110	438	679	2.49	2.64
September	1	438	682	2.29	2.57
October -	870	353	419	1.42	1.64
November	2,360	353	638	2.16	2.41
December	2,740	672	1,010	3.41	3.93
	5,970	353	950	3.21	43.57
The year	5,970	303	990	3.21	45.57

FRENCH BROAD RIVER AT HORSESHOE, N. C.

LOCATION. At steel highway bridge at Horseshoe, Henderson County.

Drainage Area. 325 square miles (measured on topographic maps). Records Available. July 18, 1904 to March 31, 1906, when station was discontinued.

GAGE. Vertical staff attached to timber in bed of stream and nailed to tree overhanging right bank 25 feet below bridge.

DISCHARGE MEASUREMENTS. Made from downstream side of bridge at gage.

CHANNEL AND CONTROL. Channel is straight for 2,000 feet above and 1,500 feet below the station.

practically permanent. There is one channel at all but extremely high stages, when a flood channel, cut through the earth approach to the bridge, comes into

use. Banks are about 15 feet high.

Extremes of Discharge. Maximum stage recorded, 16.0 feet January 23 and 24, 1906 (discharge, 5,950 second-feet); minimum stage, 0.3 foot October 17-25, 1904 (discharge, 242 second-feet).

ICE. No ice affect during period of record.

REGULATION. No information.

Accuracy. Stage-discharge relation practically permanent. Rating curve well defined below 1,600 second-feet and extended above. Gage read once daily to half-tenths below, and to tenths above 0.3 feet. Records good up to 1,600 second-feet and fair above.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF FRENCH BROAD RIVER AT HORSESHOE, N. C.

		Year			Year			
Week				Week		1000	200	
	1904	1905	1906		1904	1905	1906	
1		590	2,612	27		1,392	14-	
		1,560	1,565	28		3,575		
3		906	1,303	29		1,939		
4		738	4,076	30		1,169		
5		553	2,133	31		901		
6		848	1,457	32		1,984		
7		1,203	1,264	33		2,066		
8		1,829	1,243	34		1,671		
9		1,257	1,181	35		1,104		
0		1,134	1,443	36		903		
1		1,052	1,671	37		721		
2		920	2,113	38		649		
3		753		39		561		
4		729		40	275	571		
5		851		41	263	943		
6		717		42	244	571		
7		688		43	245	539		
8		1,233		44	318	504		
9		1,431		45	386	459		
0		1,176		46	388	434		
1		1,119		47	297	449		
2		1,204		48	283	426		
3		708		49	556	1,723		
4		1,398		50	355	1,541		
5		1,207		51	332	1,359		
6		1,010		52	700	1,273		

DISCHARGE RECORDS OF

Monthly Discharge of French Broad River at Horseshoe, N. C. [Drainage area, 325 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1904					
October	284	242	256	0.788	0.91
November	710	250	346	1.06	1.18
December	1,950	284	480	1.48	1.71
1905		_			
January	3,630	301	917	2.82	3.25
February	3,110	473	1,190	3.66	3.81
March	1,630	725	994	3.06	3.53
April		615	751	2.31	2.58
May		695	1,280	3.94	4.54
June	3,630	554	1,050	3.23	3.60
July		935	1,960	6.03	6.95
August		815	1,610	4.95	5.71
September		542	732	2.25	2.51
October		496	643	1.98	2.28
November	519	408	449	1.38	1.54
December	3,310	429	1,400	4.31	4.97
The year	5,630	301	1,081	3.53	45.27
1906					
January	5,950	995	2,380	7.32	8.44
February		1,060	1,390	4.28	4.46
March	3,510	995	1,700	5.23	6.03

FRENCH BROAD RIVER AT ASHEVILLE, N. C.

LOCATION. At Bingham School bridge 2 miles below Southern Railway Depot at Asheville, Buncombe County, from September 2, 1895 to December 31, 1901, and October 1, 1922 to December 31, 1923; and at Smith highway bridge, one mile upstream from Bingham School bridge, from March 19, 1903 to September 30, 1922. Inflow between bridges negligible. Swannanoa River enters 2 miles above the latter site.

RECORDS AVAILABLE. September 2, 1895 to December 31, 1901; March 19, 1903 to July 16, 1916, and January 1, 1917 to December 31, 1923.

Drainage Area. 949 square miles (measured on topographic maps) for Bingham School bridge; and 941 square miles for Smith bridge; revised determinations.

Gages. Original gage at Bingham School bridge, used September 2, 1895 to December 31, 1901, when observations were discontinued, was a wire gage on upstream side of bridge. Datum of this gage was changed to read 0.58 foot less on October 14, 1901, but subsequent readings were corrected to original datum. Bridge and bench marks destroyed by 1916 flood. Present chain gage is on downstream railing of concrete bridge about 50 feet downstream from original site.

Gage at Smith bridge, established by United States Weather Bureau, and used from March 19, 1903 to July 15, 1916 was a vertical staff in two sections bolted to second stone pier from the left bank. On November 1, 1904 this gage was supplemented by a chain gage on downstream side of bridge, set to the same datum, and used for negative readings. Datum remained unchanged until the flood of July 16, 1916, which destroyed the bridge and gages. From January 1 to November 21, 1917, a temporary vertical staff, just above the bridge site, was used and readings later reduced to former gage datum. Gage used from November 22, 1917 to September 30, 1922 was a vertical staff cast in concrete on the right downstream face of third pier from right abutment of concrete highway bridge at the same site. This gage is graduated from —2.00 feet to 14.70 feet and is set to the same datum as original gage at Smith bridge.

DISCHARGE MEASUREMENTS. Made from Bingham School bridge, or Smith bridge. CHANNEL AND CONTROL. At Bingham School bridge the channel is straight, the bed rocky and fairly permanent. Current is swift. Right bank below bridge is overflowed in extremely high water. Control for low and medium stages, is a rock shoal immediately below gage. Extreme high water control is probably 7,500 feet downstream where mountain spurrs close in to channel. At Smith bridge the channel is straight for 1,500 feet above and 800 feet below the station. One channel at all stages. Banks are not high. Current is irregular throughout the section, and fairly swift. Bed composed of sand and boulders and is quite uneven; practically permanent. Control is rock shoal, and piers of Southern Railway bridge 1,000 feet downstream; practically permanent, though stage-discharge relation may be affected at times by debris collected against piers of railroad bridge. There are 20 of these piers, 13 of which are in the normal river bed.

Extremes of Discharge. 1895-1901 and 1903-1923: Maximum stage recorded, at Smith bridge 23.6 feet July 16, 1916, determined by leveling from flood marks (discharge not determined); stage-discharge relation probably affected by backwater from drift lodged against Southern Railway bridge. flowed over top of railroad bridge. Stage reached at Bingham School bridge determined by leveling from flood marks, 23.1 feet (present datum) about 1 p.m. July 16, 1916, two hours after bridge was washed away (discharge estimated, 90,000 second-feet). Minimum stage recorded, —2.00 feet at Smith bridge November 1-3, 1904 (discharge, 275 second-feet).

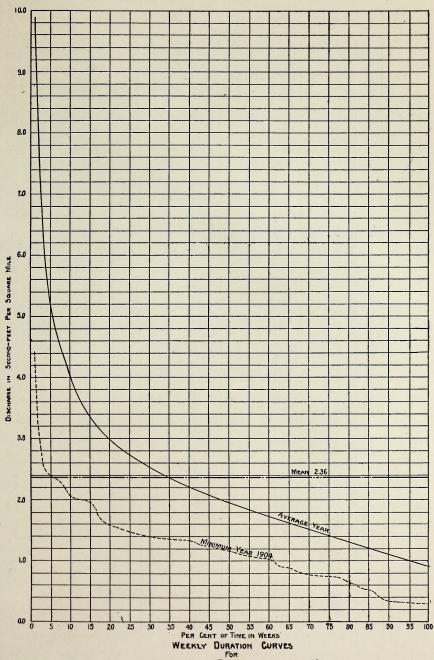
ICE. Stage-discharge relation seldom affected by ice.

REGULATION. Slight diurnal fluctuation may be caused by operation of small mills above.

Accuracy. Since 1903 stage-discharge relation practically permanent except as changed by construction of Southern Railway bridge in 1907-1908. At Bingham School bridge, stage-discharge relation likely to change with extremely high water. Several rating tables used, as follows: September 17, 1895 to March 15, 1899; September 6 to October 23, 1900 and December 14, 1900 to November 9, 1901, fairly well defined below 20,000 second-feet; March 16,1899 November 9, 1901, fairly well defined below 20,000 second-feet; March 16,1899 to June 6, 1900, well defined below 20,000 second-feet; January 1, 1908 to July 15, 1916, well defined below 12,000 second-feet; January 1, 1917 to September 30, 1922, three slightly different curves used, all fairly well defined below 12,000 second-feet. October 1, 1922 to December 31, 1923, well defined below 15,000 second-feet. From March 19, 1903, gage read to tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records previous to 1903, fair; since 1903, good.

COOPERATION. Gage-height records furnished by United States Weather Bureau, 1903 to September 30, 1922

1903 to September 30, 1922.



FRENCH BROAD RIVER AT ASHEVILLE, N.C.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET

	Year													
Week	-									1	1	1	I	
	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908
1		1,403	983	1,075	2,523	1,354	2,496			704	1,363	5,500	3,926	2,93
2		929	907	925	2,986	2,931	5,667			719				
3		1,075	1,423	1,250	2,734	4,541	3,106			790				2,93
4		4,146	1,774	3,037	2,080	3,507	2,383			1,737		12,899		
5		1,706	2,250	1,620	3,784	1,877	2,579			1,010		4,854		1,74
0		3,284	6,411	1,015	7,440	3,121	2,673			1,287				
7		2,470 $1,440$	2,967 3,996	855 1,011	3,984 3,361	10,046 5,101	2,324 1,976			979 2,230	2,533 3,349	2,484		3,87
9		1,430	2,406	829	8,047	8,493	1,783			1,385		2,611	1,997	3,06
0		1,500	5,583	760	2,873	5,454	2,360			4,670	1,917	2,840		2,36
11		1,511	6,869	787	13,941	3,386	2,143			1,897	2,004	3,197		2,179
12		1,343	4,413	839	15,579	4,257	3,239		10,056	2,039	2,107	4,019		3,847
13		1,380	2,750	3,166	8,389	3,957	10,613		8,980	2,217	1,364	3,647	1,580	2,807
14		1,610	6,826	2,357	8,969	2,979	9,187		6,413	1,456	1,337	2,993	1,764	2,029
		1,237	3,827	1,384	9,761	2,579	4,844		7,354	1,877	1,840	3,309	1,631	1,743
16		972	2,634	1,145	5,789	9,401	9,594		5,223	1,343	1,440	3,697	1,984	2,567
7		892	1,949	2,421	5,866	5,540	6,817		3,423	1,289	1,237	2,299	2,653	3,220
18		1,851 1,189	5,354 $2,051$	1,263 1,391	5,100 5,626	3,840 $2,490$	3,700 3,229		2,793 $2,459$	1,273 2,506	2,034 2,821	2,323 1,979	3,257 2,169	2,236
19		854	1,980	1,106	4,544	1,924	3,813		2,419	1,343	2,707	1,610	1,611	2,161
21		955	1,550	932	4,544	1,791	11,790		2,169	1,164	1,999	1,711	1,646	1,889
22		854	1,459	795	1,927	2,026	5,119		4,126	1,891	3,250	2,164	2,186	1,681
23		952	2,041	724	1,557	3,777	4,514		8,396	1,539	1,281	2,516	2,181	1,556
24		821	1,296	795	1,557	4,643	7,073		5,241	1,130	2,167	7,080	1,481	1,601
25		1,188	1,531	2,134	1,701	6,056	5,927		2,981	1,273	4,066	4,253	1,350	1,390
26		900	1,500	903	1,637	5,357	4,597		2,797	1,269	1,754	2,769	1,637	1,234
27		4,536	1,224	719	1,301	3,276	2,080		2,704	840	3,010	2,281	1,080	2,651
28		6,593	1,396	3,591 5,061	1,137 1,107	2,867 $2,177$			2,890 1,920	989	10,730 4,839	2,350 5,341	1,067	1,973
29		2,220 $1,600$	1,441 $1,251$	2,980	1,704	2,566			1,381	749 1,011	2,567	3,846	1,203 964	1,470 1,589
31		1,186	896	5,077	1,151	2,101			2,071	1,223	1,863	2,649	931	1,553
32		930	1,395	6,251	1,649	1,370	7,396		1,557	1,490	4,901	2,094	681	1,940
33		944	839	5,221	972		14,746		1,697	1,069	4,873	2,904	931	1,379
34		803	868	2,727	804	1,433	9,811		1,310	1,109	3, 173	2,910	1,051	4,471
35		710	739	1,907	2,059		10,490		1,079	1,426	2,347	6,123	616	3,983
36		936	714	4,993	1,778	1,149	4,879		1,236	1,171	1,750	3,997	577	2,456
		734	629	2,289	1,031	2,286	3,871		1,080	704	1,269	2,699	544	1,601
88	922 764	677 739	632 641	2,786 3,617	894 801	1,734 872	5,150 $2,921$		1,080	690 677	1,130 947	9,836 6,803	898 1,611	1,290 1,320
0	735	701	591	6,557	743	1,131	3,516		690	613		11,840	720	1,320
11	728	667	944	4,447	1,119	1,049			1,103	484	1,483	5,669	616	2,139
12	703	666	920	4,764	1,112	727			826	388	979	4,460	515	1,167
13	692	659	732	4,230	866	7,721	2,140		664	319	916	3,397	476	3,229
14	844	750	1,297	1,520	1,010	2,564	2,106		697	289	916	2,533	709	4,191
15	2,239	3,146	766	1,197	867	2,300			1,011	557	837	1,997	626	1,600
16	829	2,229	662	1,220	819	1,651			873	501	790	2,197	639	1,779
17	742	994	621	1,271	867	1,899			887	297	806	8,386	3,549	1,404
18	887	3,529 1,854	869 898	1,494 1,363	1,099 941	4,700 3,436			719 690	289 854	790 4,427	2,771 2,144	1,707 980	1,347 2,480
9 60	776 769	1,854	775	1,079	5,732	1,921	2,176 7,944		690	325	3,383	2, 144	4,473	2,480
51	1,861	1,154	1, 125	2,093	1,859	3,059			930	325	3,016	2,824	2,777	1,989
52	1,953	914	1,448	3,960	2,336	3,471			860	1,043	2,405	2,430	4,084	2,418
								10-0						

OF FRENCH BROAD RIVER AT ASHEVILLE, N. C.

	Year										
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1,757 1,797 1,798 1,494 1,573 1,177 1,319 1,290 2,570 2,633 2,377 3,124 1,114 3,917 2,033 1,717 1,799 1,799 1,169 3,033 2,510 1,560 2,860 3,480 2,346 2,346 3,460 2,346 2,34	389	1,389	1,389	1,389	2,917	7					
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					2,849						
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		1,439	1,439	1,439	1,564						
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1,190 1,010 1,589 1,153 1,126 2,347 1,569 1,219 1,196 2,779 1,347 1,730 1,329 689 1,190 1,010 1,427 1,036 1,036 1,453 4,024 1,136 1,086 2,961 874 1,454 1,894 646	685	685	685	685	1,696						
1,190 1,010 1,427 1,036 1,036 1,453 4,024 1,136 1,086 2,961 874 1,454 1,894 646					950						
3 196 1 010 1 470 1 096 1 210 6 427 2 180 1 507 004 2 744 1 061 1 764 1 660 791					919						
			721		1,285						
1,334 1,766 1,127 1,687 1,591 9,167 1,741 1,471 917 1,987 1,086 2,074 1,929 871					2,606						
1,750 1,127 1,101 1,166 1,347 2,991 1,663 1,643 894 3,719 3,341 5,194 1,326 1,260					1,659						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					1,864 1,581						
1,523 1,795 3,025 1,254 2,249 5,645 6,868 2,869 986 7,147 1,127 3,441 1,711 1,503	100	1,503	1,505	1,505	1,001						

^{*}Station was not in operation July 16, 1916 to Dec. 31, 1916 inclusive. Discharge estimated by comparative mean daily discharge hydrographs with French Broad at Dandridge and Little Tennessee at Judson. (By U. S. G. S.) †During month of January, 1918, river frozen at intervals. The missing values were estimated to make out complete year.

Monthly Discharge of French Broad River at Asheville, N. C. [Drainage area, 949 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1895					
October	785	685	717	0.756	0.870
November	1,340	735	866	.913	1.02
December	5,030	735	1,320	1.39	1.60
1896					======
January	7,700	815	1,860	1.97	2.27
February	5,030	1,280	2,170	2.29	2.47
March			1,420	1.50	1.73
April	2,700	845	1,190	1.25	1.40
May	3,420	785	1,170	1.23	1.42
June	1,480	735	969	1.03	1.15
July	21,600	710	3,490	3.68	4.24
August	1,280	685	899	.947	1.09
September	1,220	620	768	.809	.90
October	760	640	673	.709	82
November	6,680	760	2,110	2.22	2.48
December	5,960	880	1,500	1.58	1.82
The year		620	1,518	1.60	21.79
1897	2.070	707	1 000	1.00	1
January	3,050	785	1,290 4,050	1.36 4.27	1.57 4.45
February	12,500 9,060	1,760 1,900	4,610	4.27	5.60
March	11,100	1,760	3,810	4.01	4.47
April May	9,350	1,700	2,480	2.61	3.01
June	3,230	1,050	1,600	1.69	1.89
July	1,760	815	1,300	1.37	1.58
August	2,360	685	962	1.01	1.16
September	760	620	661	.697	.78
October	1,410	585	784	.826	.95
November-	2,060	585	859	.905	1.01
December	1,760	662	1,060	1.12	1.29
The year	12,500	585	1,956	2.06	27.76
1898 January	4,810	815	1,590	1.68	1.94
February	7	815	1,030	1.09	1.14
March.	6,440	735	1,250	1.32	1.52
April	3,420	958	1,860	1.96	2.19
May	- 2,360	785	1,120	1.18	1.36
June	3,240	685	1,120	1.18	1.32
July	9,060	620	2,920	3.08	3.55
August	15,800	1,900	4,560	4.81	5.54
September		1,480	3,310	3.49	3.89
October	13,400	1,280	4,650	4.90	5.65
November.		1,000	1,310	1.38	1.54
December	5,260	915	2,160	2.28	2.63
The year	15,800	620	2,240	2.36	32.27

Monthly Discharge of French Broad River at Asheville, N. C.—Continued

		Y			
Month -	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1899					
January	3,610	1,760	2,520	2.66	3.07
February	16,800	1,690	5,580	5.88	6.12
March	29,800	2,700	9,740	10.3	11.87
April	11,800	5,060	7,520	7.92	8.84
May	6,200	1,770	4,560	4.81	5.54
June	2,140	1,300	1,650	1.74	1.94
July	2,630	955	1,310	1.38	1.59
August	3,280	775	1,260	1.33	1.53
September	3,280	. 660	1,210	1.28	1.43
October	1,600	660	960	1.01	1.16
November	1,240	815	925	.975	1.09
December	11,800	860	2,590	2.73	3.15
The year	29,800	660	3,319	3.50	. 47.33
1900 January	5,620	1,060	2,980	3.14	3.62
February	17,200	1,600	5,200	5.48	5.71
March	15,200	3,050	5,320	5.61	6.47
April	15,200	2,240	5,000	5.27	5.88
May	5,900	1,120	2,380	2.51	2.89
June	12,800	1,340	4,760	5.02	5.60
July	4,900	1,990	2,730	2.88	3.32
August	2,190	1,260	1,500	1.58	/ 1.82
September	6,320	585	1,500	1.58	1.76
October	17,600	585	2,610	2.75	3.17
November	9,910	1,520	2,670	2.81	3.14
December	5,730	1,800	2,850	3.00	3.46
The year	17,600	585	3,292	3.47	46.84
1901	19 700	1 000	2 200	2 40	4.01
January	13,500	1,990	3,300	3.48 2.48	2.58
February	4,900	1,800	2,350		5.14
March	22,800	1,610	4,230	4.46	
April	16,500	3,390	7,380	7.78	8.68 6.92
May	24,700	2,720	5,690	6.00	6.40
July	11,300	3,390	5,450	5.74 2.90	3.34
August	10 700	2,140	2,750	9.89	11.40
September	19,700	1,900	9,390	9.89	5.29
	9,060	2,630	4,480 2,630	2.77	3.29
October November	5,960	2,140		1.99	2.22
December	2,140 26,900	1,790 1,790	1,890 5,970	6.29	7.25
The year	26,900	1,610	4,626	4.88	66.42
	,500				

MONTHLY DISCHARGE OF FRENCH BROAD RIVER AT ASHEVILLE, N. C.—Continued

	3	Discharges i	arges in Second-feet				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches		
1903					*		
April	10,400	2,890	5,670	5.97	6.6		
May	4,270	1,930	2,510	2.64	3.0		
June	12,400	2,390	5,010	5.28	5.8		
July	4,060	1,250	2,190	2.31	2.6		
August	3,070	1,010	1,580	1.66	1.9		
September	1,510	690	1,050	1.11	1.2		
October	1,510	600	799	.842	.9		
November	1,650	690	871	.918	1.0		
December	1,510	690	788	.830	.9		
1904							
January	4,060	690	990	1.04	1.2		
February	4,270	900	1,440	1.52	1.6		
March	9,080	1,130	2,550	2.69	3.1		
April	3,070	1,130	1,480	1.56	1.7		
May	5,700	1,010	1,570	1.65	1.9		
June	2,890	1,010	1,420	1.50	1.6		
July	1,510	690	895	.943	1.0		
August	2,720	690	1,320	1.39	1.6		
September	1,510	600	825	.870	.9		
October	690	285	435	.458	.5		
November	1,510	275	404	.426	.4		
December	2,550	285	627	.661	.7		
The year	9,080	275	1,163	1.23	16.6		
1905	0.000	coo	1 000	1.00	2.1		
January	9,080 6,500	600 790	1,800 2,290	1.90 2.41	2.5		
March	4,270	1,250	1,900	2.41	2.3		
April	2,390	1,010	1,460	1.54	1.7		
May	7,890	1,130	2,660	2.80	3.2		
June	7,890	1,010	2,270	2.39	2.6		
July	18,600	1,790	4,990	5.26	6.0		
August	10,700	1,510	3,610	3.80	4.3		
September	2,720	900	1,310	1.38	1.5		
October	3,640	790	1,080	1.14	1.3		
November	. 900	790	819	.875	.9		
December	7,320	790	3,120	3.29	3.7		
The year	18,600	600	2,276	2.40	32.6		
1906	25,800	1,790	5,960	6.28	7.2		
JanuaryFebruary	5,200	2,230	2,920	3.08	3.2		
March	6,770	2,230	3,320	3.50	4.0		
	8,480	2,000	3,120	3.29	3.6		
April	3,440	$\frac{2,250}{1,250}$	1,930	2.03	2.3		
June	11,700	1,510	4,010	4.22	4.7		
July	7,600	1,790	3,360	3.54	4.0		
August	8,480	1,650	3,240	3.41	3.9		
September	17,400	2,080	5,810	6.12	6.8		
October	15,800	2,720	6,000	6.32	7.2		
November	14,600	1,650	3,730	3.93	4.3		
December	4,270	2,080	2,530	2.67	3.0		
The year			3,828	4.03	54.80		
THE VEST.	25,800	1,250	3,828	4.03	04.8		

MONTHLY DISCHARGE OF FRENCH BROAD RIVER AT ASHEVILLE, N. C.—Continued

		n Second-fee	t		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907					
January	7,320	1,650	2,360	2.49	2.8
February	3,070	1,380	1,750	1.85	1.98
March	3,070	1,250	1,720	1.81	2.09
April	5,200	1,250	2,010	2.12	2.30
May	8,480	1,250	2,100	2.21	2.5
June	3,850	1,130	1,810	1.91	2.13
July	1,510	900	1,100	1.16	1 34
August	1,380	600	833	.878	1.0
September	4,490	460	881	.928	1.04
October	900	460	570	.601	.69
November	7,040	515	1,560	1.64	1.88
December	8,780	900	2,990	3.15	3.68
The year	8,780	460	1,640	1.73	23.47
1908					
January	15,200	1,710	3,340	3.52	4.00
February	15,200	1,710	4,270	4.50	4.8
March	6,640	1,820	2,810	2.96	3.4
April	6,390	1,600	2,390	2.52	2.83
May	3,770	1,710	2,140	2.26	2.6
June	1,820	1,190	1,460	1.54	1.73
July	4,150	1,100	1,900	2.00	2.3
August	12,100	1,190	2,770	2.92	3.3
September	5,900	1,190	1,670	1.76	1.9
October	8,230	1,010	2,330	2.46	2.8
November	3,770	1,290	1,700	1.79	2.00
December	5,430	1,390	2,180	2.30	2.6
The year	15,200	1,010	2,413	2.54	34.59
January	4,980	1,600	2,230	2.35	2.7
February	6,140	1,600	2,960	3.12	3.2
March.	6,140	2,320	3,420	3.60	4.1
April	4,350	1,710	2,320	2.44	2.7
May	10,800	1,940	4,270	4.50	5.19
June	15,200	3,240	5,770	6.08	6.7
July	4,350	1,710	3,000	3.16	3.64
August	4,150	1,290	2,030	2.14	2.4
September	6,640	1,190	1,860	1.96	2.19
October	2,750	1,190	1,500	1.58	1.85
November	1,190	1,100	1,180	1.25	1.40
December	7,960	1,010	2,040	2.15	2.48
The year	15,200	1,010	2,715	2.86	38.80

Monthly Discharge of French Broad River at Asheville, N. C.—Continued

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1910					4
January	4,350	1,390	1.790	1.89	2.18
February	5,900	1,290	2,000	2.11	2.20
March	6,390	1,390	2,150	2.27	2.62
April	2,320	1,190	1,440	1.52	1.70
May	7,160	1,100	2,170	2.29	2.64
June	4,350	1,390	1,890	1.99	2.22
July	4,980	1,390	2,270	2.39	2.76
August		1,010	2,190	2.31	2.66
September		1,390	3,470	3.66	4.08
October	4,150	1,010	1,560	1.64	1.89
November	1,190	1,010	1,020	1.07	1,19
December	3,770	920	1,410	1.49	1.72
The year	25,100	920	1,947	2.05	27.86
1911					
January		1,100	1,890	1.99	2.29
February		1,100	1,540	1.62	1.69
March	2,320	1,100	1,420	1.50	1.73
April		1,290	3,790	3.99	4.45
May	2,460	1,190	1,630	1.72	1.98
June		830	1,020	1.07	1.19
July	1,490	670	915	.964	1.11
August	3,410	590	966	1.02	1.18
September.	3,770	670	1,100	1.16	1.29
October	6,390	670	1,590	1.67	1.92
November December	2,320 5,660	1,010 1,010	1,470 1,990	1.55 2.10	1.73 2.42
The year	9,070	590	1,610	1.70	22.98
January	4,350	1,390	1,850	1.95	2.25
February	6,640	1,290	2,530	2.66	2.87
March	9,940	2,190	4,010	4.22	4.86
April	5,200	2,190	2,990	3.15	3.51
May	4,550	1,710	2,590	2.73	3.15
June	4,150	1,490	2,090	2.20	2.46
July	3,770	1,490	2,390	2.52	2.90
August	3,410	1,190	1,560	1.64	1.89
September	5,430	1,010	1,570	1.65	1.84
October	1,600	1,010	1,160	1.22	1.41
November.	3,240	1,010	1,240	1.31	1.46
December	2,190	1,100	1,290	1.36	1.57
The year	9,940	1,010	2,106	2.22	30.17

Monthly Discharge of French Broad River at Asheville, N. C.—Continued

		Discharges in	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1913			4		
January	5,660	1,190	1,690	1.78	2.05
February	4,980	1,290	2,000	2.11	2.20
March	16,200	1,290	5,460	5.75	6.63
April	8,510	2,190	3,640	3.84	4.28
May	7,160	1,600	2,290	2.41	2.78
June	4,150	1,390	1,900	2.01	2.24
July	2,600	920	1,340	1.41	1.63
August	3,240	1,010	1,510	1.59	1.83
September	3,070	920	1,450	1.53	1.71
October	5,660	. 830	1,400	1.48	1.71
November	1,600	920	1,150	1.22	1.36
December	3,070	1,100	1,650	1.74	2.01
The year	16,200	830	2,123	2.24	30.43
1914					
January	2,320	1,190	1,500	1.58	1.82
February	3,240	1,390	2,010	2.12	2.21
March	1,940	1,290	1,610	1.70	1.96
April	7,690	1,490	2,540	2.67	2.98
May	1,940	1,100	1,330	1.40	1.61
June	1,490	920	1,080	1.14	1.27
July	1,600	590	963	1.02	1.18
August	1,710	590	884	.932	1.07
September	1,010	590	729	.769	.86
October	17,600	590	2,710	2.86	3.30
November	12,100	1,010	1,850	1.95	2.18
December	14,300	2,190	5,700	6.01	6.93
The year	17,600	590	1,909	2.01	27.37
January	9,070	2,750	4,870	5.13	5.91
February	9,940	2,190	4,690	4.94	5.14
March	6,390	1,940	2,850	3.01	3.47
April	2,320	1,600	1,860	1.96	2.19
May	4,150	1,490	2,040	2.15	2.48
June	4,980	1,290	2,200	2.32	2.59
July	5,900	1,190	2,130	2.25	2.59
August	3,410	1,190	1,700	1.79	2.06
September		1,190	1,850	1.95	2.18
October.	6,140	1,820	2;980	3.14	3.62
November	7,690	1,490	2,270	2.39	2.67
December	. 15,200	1,600	4,230	4.46	5.14
The year	15,200	1,190	2,806	2.96	40.04

MONTHLY DISCHARGE OF FRENCH BROAD RIVER AT ASHEVILLE, N. C .- Continued

			Discharges i	n Second-fee	t	
Month		Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1916	1					
January		9,070	2,320	3,370	3.55	4.09
Feburary	Power of the same of the same	9,360	2,060	3,660	3.86	4.16
March		3,410	1,820	2,320	2.44	2.81
April		3,240	1,600	2,030	2.14	2.39
May		10,200	1,190	2,230	2.35	2.71
June		6,640	1,600	2,860	3.02	3.37
July*		66,000	1,600	11,496	12.11	13.96
		6,600	1,650	2,884	3.04	3.50
August		2,000	1,050	1,348	1.42	1.64
September			980			1.59
October		3,300		1,312	1.38	
November		1,800	980	1,186	1.25	1.44
December		4,800	1,300	1,937	2.04	2.35
The year		66,000	980	3,053	3.22	44.01
1917		2 400	1 010	1 070	0.00	0.40
January		3,480	1,310	1,970	2.08	2.40
February		4,840	1,210	2,090	2.20 4.61	2.29 5.32
March	A THE PARTY OF THE	9,770	2,100	• 4,370	2.82	
April		7,020	1,420	2,670		3.15
May		2,230	1,210	1,600	1.68	1.94
June		2,500	1,020	1,300	1.37	1.53
July		2,500	840	1,360	1.44	1.66
August		1,980	680	1,120	1.18	1.36
September		7,020	1,020	2,010	2.12	2.36
October		5,750	1,020	1,590	1.67	1.92
November		1,750	930	1,200	1.27	1.42
December		1,110	760	914	.963	1 .11
The year1918		9,770	680	1,850	1.95	26.46
January†		10,400	1,110	2,917	3.07	3.54
February		5,750	1,980	2,600	2.74	2.85
March.		2,230	1,420	1,700	1.79	2.06
April		5,990	1,420	1,990	2.10	2.34
May		2,360	1,530	1,860	1.96	2.26
June		3,670	1,110	1,570	1.65	1.84
July		2,360	930	1,240	1.31	1.51
August		2,500	840	1,240	1.31	1.46
September		1,310	760	977	1.03	1.15
October		22,100	630	3,900	4.11	4.74
November		13,800	1,770	3,500	3.69	4.12
December		25,200	1,770	5,560	5.86	6.76
- Comment						
The year		25,200	630	2,418	2.55	34.63

^{*}Station was not in operation July 16, 1916 to Dec. 31, 1916 inclusive. Discharge estimated by comparative mean daily discharge hydrographs with French Broad at Dandridge and Little Tennessee at Judson. (By U. S. G. S.)
†During month of January, 1918, river frozen at intervals. The missing values were estimated to make out complete year.

MONTHLY DISCHARGE OF FRENCH BROAD RIVER AT ASHEVILLE, N. C.—Continued

		Discharges	in Second-fe	et	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1919					
January	9,190	2,570	4,080	4.30	4.90
February	6,020	2,130	2,960	3.12	3.25
March.	9,190	2,570	4,250	4.48	5.16
April	4,270	2,130	2,680	2.83	3.16
May	4,080	2,130	2,730	2.88	3.32
June	6,020	1,550	2,730	2.42	2.70
	6,020	1,330	2,300	2.42	2.79
July	3,370	1,140	1,590	1.68	
August	1,440	780		.988	1.94 1.10
September.			938		
October	2,000	700	946	.996	1.15
November	1,770	780	990	1.04	1.16
December	7,020	950	1,690	1.78	2.05
The year	9,190	700	2,288	2.41	32.74
1920 January	3,370	950	1,580	1.66	1.91
February	8,620	1,550	2,390	2.52	2.72
March	7,800	1,240	2,840	3.00	3.46
April	17,000	2,570	5,140	5.42	6.05
May	2,720	1,660	2,040	2.15	2.48
June	4,660	1,340	1,970	2.08	2.32
July	4,080	1,240	2,020	2.13	2.46
August	4,870	1,140	3,160	3.33	3.84
	3,200	1,440	2,020	2.17	2.42
September	2,540	980	1,250	1.32	1.52
October	3,690	980		1.50	1.67
November	10,400	1,530	1,420 3,360	3.54	4.03
The sees	17,000	950	2,433	2.57	34.88
The year1921	17,000	930	2,400	2.31	34.80
January	7,580	1,890	2,850	3.01	3.47
February.	10,200	2,400	3,910	4.12	4.29
March	3,150	1,770	2,150	2.27	2.62
April	10,200	1,650	2,830	2.98	3.32
May	5,500	1,890	2,610	2.75	3.17
June	2,990	1,650	2,050	2.16	2.41
July	4,300	1,420	1,940	2.05	2.36
August	2,270	1,310	1,700	1.79	2.06
September	2,270	980	1,320	1.39	1.55
October	3,150	680	1,060	1.12	1.29
November	2,830	1,010	1,570	1.65	1.84
December	3,890	1,200	1,850	1.95	2.25
The year	10,200	680	2,153	2.27	30.63

Monthly Discharge of French Broad River at Asheville, N. C.—Continued

	1	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1922					
January	6,280	1,310	2,200	2.32	2.68
February	6,800	1,770	2,730	2.88	3.00
March.	7,580	2,140	3,890	4.10	4.73
April	6,540	2,270	3,290	3.46	3.86
Mav	6,280	2,140	3,150	3.32	3.83
June	3,690	1,530	2,350	2.48	2.77
July	3,150	1,650	2,160	2.28	2.63
August	1,770	880	1,190	1.26	1.45
September	2,830	580	860	0.906	1.01
October	2,300	610	946	0.997	1.15
November	740	610	679	0.715	0.80
December	6,080	740	1,580	1.66	1.91
The year	7,580	580	2,085	2.20	29.82
January	5, 860	1,120	1,850	1.95	2.25
February	4,800	1,380	2,160	2.28	2.37
March	8,940	1,380	2,700	2.85	3.29
April	5,860	1,640	2,130	2.24	2.50
May	8,940	1,640	3,560	3.75	4.32
June	7,300	1,640	2,760	2.91	3.25
July	2,800	1,180	1,630	1.72	1.98
August	2,030	990	1,390	1.46	1.68
September	5,000	860	1,430	1.51	1.68
October	1,280	686	836	0.881	1.02
November	3,770	804	1,130	1.19	1.33
December	4,370	1,280	1,910	2.01	2.32
The year	8,940	686	1,957	2.06	27.99

FRENCH BROAD RIVER AT OLDTOWN, NEAR NEWPORT, TENN.

LOCATION. At highway bridge at Oldtown, on Newport-Morristown road, 2½ miles northeast of Newport, Cocke County. Pigeon River enters 4 miles below.

Drainage Area. 1,740 square miles (measured on topographic maps).

RECORDS AVAILABLE. September 4, 1900 to November 9, 1901; September 20,

1902 to December 31, 1905; August 16 to December 31, 1907; November 17, 1920 to December 31, 1923.

Gage. Wire gage used from September 4, 1900 to November 9, 1901, was destroyed early in spring of 1902 when bridge was washed out by a flood. On October 27, 1909 to the series of 1902 when bridge was washed out by a flood. 1902, a wire gage was installed on the new bridge, at same site as bridge which was destroyed; gage set to independent datum. Wire gage replaced April 29, 1903, by chain gage set to same datum, which remained unchanged until December 31, 1907. From November 17, 1920 to December 31, 1923, chain gage set to an independent datum.

DISCHARGE MEASUREMENTS. Made from highway bridge at gage. CHANNEL AND CONTROL. Channel fairly straight for 500 feet above and below gage. Banks are high and not subject to overflow. Bed composed of sand and gravel; fairly regular and subject to little change. Conditions of control not known prior to 1920, at which time a rock and gravel shoal 300 feet below

gage formed the control. This shoal probably changes during high water.

EXTREMES OF DISCHARGE. Maximum stage recorded, 12.0 feet April 8, 1903 (discharge, 62,200 second-feet); minimum discharge, 440 second-feet October 18, 1904 and September 21, 1907; gage height 0.9 foot.

ICE. Stage-discharge relation not affected by ice.

REGULATION. None to affect earlier records, and later records to only a slight extent, if at all.

extent, if at all.

Accuracy. Stage-discharge relation practically permanent for ordinary stages; shifts slightly at extremely high stages. Rating curves used, as follows: September 4, 1900 to November 9, 1901, fairly well defined above 1,500 second-feet; November 1, 1902 to April 8, 1903, well defined between 1,000 and 15,000 second-feet; April 9, 1903 to December 31, 1907, well defined between 500 and 7,000 second-feet; November 17, 1920 to December 31, 1923, three curves well defined below 7,500 second-feet. Daily discharge ascertained by applying gage height to rating table. Records good for medium stages and fair to poor for extremely high or low stages. for extremely high or low stages.

DISCHARGE RECORDS OF

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF FRENCH BROAD RIVER AT OLDTOWN, NEAR NEWPORT, TENN. [Drainage area, 1740 square miles]

				Ye	ar			
Week	1902	1903	1904	1905	1920	1921	1922	1923
1		3,321	927	1,824		2,939	1,783	4,60
2		2,717	1,281	5,741		4,591	2,697	2,15
3		2,521	2,369	2,769		5,131	4,986	2,09
4		2,259	2,536	1,519		3,139	5,833	3,12
5		3,357	1,427	1,526		4,326	2,804	5,99
6		8,066	2,043	3,036		8,701	4,080	6,11
7		12,081	1,457	3,721		6,280	7,196	4,57
8		5,276	2,611	7,490		5,354	3,704	2,32
9		11,710	2,703	3,546		3,571	4,451	2,25
10		9,897	6,087	2,979		2,990	6,257	4,81
11		8,387	2,919	3,023		2,599	7,197	7,54
12	7	19,904	5,459	2,451		3,106	4,351	5,90
13		13, 299	3,914	2,003		3,440	6,719	3,19
14		16,496	2,170	2,276		3,224	6,220	2,67
15		15,256	2,471	3,677		2,383	4,469	3,43
16		9,616	2,077	2,283		7,164	4,823	3,35
17		5,734	2,543	1,931		4,614	3,831	2,78
18		4,363	2,491	2,830 5,519		4,014	5,617	2,73
19		3,500 $2,971$	3,951 $2,133$	5,831		3,811	4,606 4,144	4,17
20		2,971	1,677	3,594		3,484 4,586	4,144	4,62 5,55
21		4,701	2,376	3,896		3,084	3,463	8,09
23		10,640	2,023	1,949		2,623	4,474	4,21
24		6,414	1,513	2,779		2,753	3,029	3, 15
25		3,630	1,830	4,986		2,754	3,216	2,58
26		3,507	1,960	2,863		2,924	2,260	2,89
27		3,179	1,386	4,146		2,014	3,010	2,32
28		3,583	1,289	18,524		2,270	3,134	2,49
29		2,550	875	5,874		5,470	4,067	3,15
30		1,840	1,484	3,599		2,807	3,064	1,69
31		2,663	1,424	2,856		3,414	2,106	2,20
32		2,210	2,191	6,054		2,811	2,019	2,96
33		2,173	1,773	6,285		5,400	1,756	1,92
34		1,770	1,759	3,581		2,749	1,644	1,95
35		1,493	1,823	2,667		2,079	1,296	1,56
36		1,263	1,756	2,326		1,796	1,327	1,62
37		1,086	1,102	1,660		1,837	1,067	1,55
38		1,237	798	1,540		1,691	880	2,02
39		951	744	1,230		2,017	1,212	1,68
40		879	596	1,331		1,850	897	1,12
41		1,300	534	1,941		1,320	1,909	1,00
42		1,086	503	1,390		1,163	1,234	1,08
43		903	536	1,360		1,101	1,111	1,160
44	1,010	914	570	1,176		2,387	967	1,029
45	1,270	1,407	1,084	1,071		1,674	984	2,39
46	1,147	1,317	1,061	964	1.004	1,860	976	1, 20
47	1,733	1,499	980	1,002	1,924	2,373	871	1,12
48	2,521	927	771	1,047	2,000	2,829	944	1,54
49	4,006	951 903	1,753 1,221	4,814 4,380	2,834 7,393	2,861 1,843	2,034 2,833	2,961
50 51	2,259 3,734	1,153	966	3,451	3,987	2,780	4,861	2,061
52	2,793	1,153	1,899	3, 151	4,736	2,780	2,163	2,379
14	4, 190	1,010	1,000	0, 101	±, 100	4,400	2,100	4,40

MONTHLY DISCHARGE OF FRENCH BROAD RIVER AT OLDTOWN, NEAR NEWPORT, TENN.
[Drainage area, 1,740 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1902					
November	2,900	680	1,500	0.862	0.96
December	6,380	2,110	3,160	1.82	2.10
1903					
January	3,790	2,110	2,680	1.54	1.78
February	26,400	2,110	8,110	4.66	4.85
March	60,800	4,110	12,700	7.30	8.42
April	62,200	4,500	11,700	6.70	7.48
May	5,590	2,430	3,390	1.95	2.25
June	14,800	2,970	6,130	3.52	3.93
July	4,850	1,660	2,770	1.59	1.83
August	2,970	1,200	2,090	1.20	1.38
September	1,420	830	1,150	.661	.74
October	1,660	830	1,020	.586	.68
November	2,970	830	1,270	.730	.81
December	1,910	830	1,080	.621	.72
The year	62,200	830	4,507	2.59	34.87
1904 January	4,160	830	1,750	1.01	1.16
February	5,590	1,200	2,060	1.18	1.27
March	13,600	2,430	4,390	2.52	2.90
April	3,540	1,910	2,350	1.35	1.51
May	7,650	1,420	2,430	1.40	1.61
June	3,840	1,200	1,960	1.13	1.26
July	2,560	755	1,280	.736	.85
August	2,700	1,200	1,880	1.08	1:24
September	2,430	680	1,110	.638	.71
October	680	440	543	.312	.36
November	1,910	495	929	.534	.60
December	3,400	830	1,370	.787	.91
The year	13,600	440	1,838	1.06	14.38
1905	17 100		0.770	1 70	1 00
January	15,400	755	2,770	1.59 2.48	1.83 2.59
February	13,000	1,420	4,280		1.79
March	4,500	1,910	2,700	1.55 1.45	1.62
April	5,220	1,660	2,520	2.62	3.02
May	10,700	1,910 1,540	4,560 3,090	1.78	1.99
June	8,600 44,600	2,840	7,620	4.38	. 5.05
July	14,200	2,840	4,430	2.55	2.94
August	3,250	1,100	1,730	.994	1.11
October	4,330	1,100	1,490	.856	.99
	1,200	915	1,020	.586	.65
November December	11,300	1,100	3,740	2.15	2.48
The year	44,600	755	3,329	1.91	26.06

MONTHLY DISCHARGE OF FRENCH BROAD RIVER AT OLDTOWN, NEAR NEWPORT, TENN.—Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1920					
November 17-30	5,310	1,440	2,350	1.35	0.70
December	16,800	2,020	4,570	2.63	3.03
1921			*****		
January	8,730	2,470	4,010	2.30	2.65
February	20,400	3,220	6,090	3.50	3.64
March	4,640	2,380	3,020	1.74	2.01
April	16,100	2,200	4,340	2.49	2.78
May	7,250 4,130	2,760 2,090	3,920 2,750		2.59
June				1.58	1.76
JulyAugust	11,000 10,900	1,790 1,920	3,110 3,390	1.79	2.06
September	2,590	1,320	1,850	1.95	2.25
	4,020	958	1,420	.816	1.18
October November Nove	4,580	1,420	2,220	1.28	.94
December	4,870	1,710	2,440	1.40	1.43
December	4,010	1,710	2,440	1.40	1.61
The year	20,400	958	3,213	1.85	24.90
January	12,500	1,710	3,730	2.14	2.47
February	12,800	2,470	4,470	2.57	2.68
March	13,800	3,090	5,990	3.44	3.97
April	8,570	3,480	4,920	2.83	3.16
May	10, 200	2,960	4,450	2.56	2.95
June	6,070	2,130	3,320	1.91	2.13
July	4,870	2,240	3,230	1.86	2.14
August	3,350	1,160	1,760	1.01	1.16
September	2,240	830	1,120	.644	.72
October	3,120	776	1,260	.724	.83
November	1,150	805	935	.537	.60
December	10,700	956	2,830	1.63	1.88
The year	13,800	776	3,168	1.82	24.69
1923	9,370	1,740	3,290	1.89	0.10
January	9,040	1,740	4,360	2.51	2.18
February	16,200	2,050	5,040	2.90	2.61
March April	6,450	2,030	3,060	1.76	3.34
Mav		2,270	4,830	2.78	1.96 3.20
June	9,370	2,380	3,700	2.13	2.38
July	6,130	1,540	2,380	1.37	1.58
August	3,370	1,360	2,140	1.37	1.58
September	5,200	1,080	1,700	.977	1.42
October	1,660	885	1,080	.621	.72
November	4,760	1,040	1,450	.833	.72
December	5,710	1,560	2,410	1.39	1.60
The year	16,200	885	2,953	1.70	23.01

FRENCH BROAD RIVER AT DANDRIDGE, TENN.

LOCATION. At steel highway bridge at Dandridge, Jefferson County, 12 miles by road and 23 miles by river below mouth of Nolichucky River, 28 miles below mouth of Pigeon River, and 40 miles above junction of French Broad and Holston rivers.

Drainage Area. 4,450 square miles (measured on topographic maps).

Records Available. October 1, 1918 to December 31, 1923. Gage-height records obtained by U. S. Weather Bureau since December 1, 1904.

Gage. Graduations painted on shoreward side, near downstream end of second concrete pier from right end of bridge.

DISCHARGE MEASUREMENTS. Made from downstream side of highway bridge to which gage is attached.

CHANNEL AND CONTROL. Bed of stream at gage composed of silt and mud; shifting. One channel at all stages. Control formed by series of milldams and rock dykes across the three channels, into which the river divides 1 mile below station. The dykes are in very poor repair and are subject to change at each flood. Right bank high; left bank is overflowed some distance above gage at

stages above 12 feet.

EXTREMES OF DISCHARGE. Maximum stage recorded, 16.5 feet April 3, 1920 (discharge, 81,600 second-feet); minimum stage, 0.01 foot October 10-12, 1918 (discharge, 830 second-feet).

The United States Weather Bureau records a maximum stage of 28.0 feet

May 21, 1901, and a minimum stage of—0.7 foot December 3, 1910, and on other dates.

ICE. Stage-discharge relation not affected by ice. REGULATIONS. Slight diurnal fluctuations.

Accuracy. Stage-discharge relation not permanent. Average rating curve fairly well defined between 2,000 and 30,000 second-feet; poorly defined outside those limits. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records below 30,000 second-feet, fair, above that point they may be in error due to lack of information in regard to flood flow. Discharge for individual days may be in error on account of poor location of gage for observation.

COOPERATION. Gage-height record furnished by United States Weather Bureau.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF FRENCH BROAD RIVER AT DANDRIDGE, TENN.

	Year									
Week	1918	1919	1920	1921	1922	1923				
1		24,150	2,983	6,249	4,291	10,93				
2		8,934	3,560	10,091	5,714	5,15				
3		9,606	4,571	12,420	15,139	5,07				
4		16,951	11,820	7,264	21,763	8,41				
5		9,860	7,704	9,471	6,567	21,51				
6		6,460	12,460	21,761	7,799	17,24				
7		7,489	5,757	18,567	21,314	17,729				
8		10,686	9,356	12,134	9,944	6,690				
9		12,346	8,639	7,353	13,030	5,49				
0		17,823	6,586	5,586	16,077	16,23				
1		11,360	23,177	5,074	22,314	22,17				
2		8,913	19,880	5,476	10,687	17,70				
3		8,754	14,403	6,456	14,251	8,44				
4		7,246	44,700	6,429	13,634	6,62				
5		6,970	12,451	4,354	9,571	7,24				
6		8,180	7,617	13,919	11,904	7,79				
7		5,914	8,751	7,761	10,269	6,16				
8		8,167	7,110	8,311	15,669	7,29				
9		7,247	6,439	8,994	12,237	9,92				
0		6, 197	5,176	6,944	9,419	11,02				
1		6,336	4,981	9,233	9,027	12,90				
2		5,563	4,653	6,236	6,939	17,30				
3		3,964	8,263	4,731	6,420	9,23				
4		3,073	4,287	5,501	7,426	7,13				
5		3,883	7,001	6,209	7,243	5,58				
6		12,789	4,887	5,810	5,151	7,49				
7		3,900	4,786	4,194	8,484					
8		3,371	3,900	4,740	9,289					
9		6,623	6,701	13,801	9,237					
0		5,210	4,409	9,194	7,563					
1		3,704	3,217	11,277	5,214					
2		3,253	8,231	7,507	4,257					
3		4,456	13,226	14,096	3,643					
4		2,926	10,371	8,859	3,514					
5		2,177	9,723	5,683	3,396					
6		2,253	5,776	3,960	3,060	3,20				
7		1,619	8,756	3,820	2,421	3,10				
8		1,175	6,251	3,001	1,981	2,90				
9		1,706	4,587	3,491	2,267	3,58				
0	1,460	1,278	3,889	3,909	1,984	2,20				
1	1,046	1,706	2,500	2,754	3,380	2,013				
2	1,160	2,901	2,220	2,294	2,327	2,014				
3	15,119	3,681	2,100	2,137	2,233	2,390				
4	34,586	2,329	2,624	4,557	2,137	2,169				
5	6,226	1,756	2,114	3,630	2,016	3,18				
6	4,614	2,717	4,223	4,343	2,051	2,320				
7	6,233	. 1,983	4,439	5,241	2,043	2,26				
8	5,497	1,900	3,914	6,961	1,691	3,176				
9	4,357	2,727	4,480	7,357	4,476	5,117				
0	5,417	14,613	15,757	4,334	8,034	4,424				
1	18,151	5,770	9,641	5,034	15,523	5,039				
2	18, 191	3,653	10,530	5,365	5,148	5,676				

MONTHLY DISCHARGE OF FRENCH BROAD RIVER AT DANDRIDGE, TENN.
[Drainage area, 4,450 square miles]

		Discharges in	Second-fee	5	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1918					
October	63,300	830	8,900	2.00	2.3
November.	41,800	3,890	8,150	1.83	2.0
December	49,300	3,810	11,400	2.56	2.9
1919					
January	45,000	6,710	14,700	3.30	3.8
February	18,100	5,950	8,930	2.01	2.0
March.	24,500	7,100	11,600	2.61	3.0
April	10,900	5,310	7,130	1.60	1.7
May	10,900	5,410	6,880	1.55	1.7
June	22,600	2,760 2,880	5,820 4,740	1.31 1.07	1.4 1.2
July	11,200 5,310	1,620	3,310	.744	.8
August	3,620	934	1,770	.398	.4
September	5,120	974	2,410	.542	1.6
November	3,510	1,670	2,110	.474	.5
December	22,000	1,550	6,280	1.41	1.6
	45,000	934	6,307	1.42	19.2
The year	45,000	954	0,307	1.42	19.4
January	21,400	2,530	6,040	1.36	1.5
February	25,100	4,960	8,920	2.00	2.:
March	35,800	4,960	14,700	3.30	3.8
April	81,600	6,430	17,900	4.02	4.4
May	7,940	4,590	5,730	1.29	1.4
June	13,600	4,120	6,000	1.35	1.5
July	6,990	2,980	4,810	1.08	1.5
August	18,200	2,710	9,490	2.13	2.4
September	14,100	3,810	6,350	1.43	1.0
October	4,650	2,100	2,710	.609	
November	9,460	2,000	3,400	.764	
December	39,900	3,640	9,780	2.20	2.5
The year	81,600	2,000	7,986	1.79	24.4
1921 January	18,900	5,610	8,980	2.02	2.3
February	58,400	6,990	15,400	3.46	3.0
March	9,670	4,060	5,740	1.29	1.4
April	29,400	3,780	8,050	1.81	2.0
May	15,000	5,610	8,190	1.84	2.:
June	7,350	4,200	5,530	1.24	1.5
July	31,500	3,250	7,830	1.76	2.0
August	31,500	4,350	9,990	2.24	2.5
September	4,800	2,880	3,640	.818	
October	4,730	1,980	2,700	.607	
November	10,000	2,890	5,070	1.14	1.:
December	9,640	3,640	5,650	1.27	1.4
The year	58,400	1,980	7,231	1.62	21.

MONTHLY DISCHARGE OF FRENCH BROAD RIVER AT DANDRIDGE, TENN.-Continued

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1922					
January	56,000	3,900	11,300	2.54	2.93
February	46,600	5,930	11,400	2.56	2.67
March	41,700	7,540	16,000	3.60	4.15
April	21,200	7,540	11,700	2.63	2.93
May	30,400	6,240	10,900	2.45	2.82
June	12,300	4,730	7,290	1.64	1.83
July	13,100	5,020	8,380	1.88	2.17
August	6,240	2,650	3,970	.892	1.03
September	5,020	1,770	2,440	.548	.61
October	5,320	1,770	2,450	.551	.64
November	2,420	1,380	2,000	.449	.50
December	35,200	1,200	7,760	1.74	2.01
The year	56,000	1,200	7,966	1.79	24.29
1925 January	24, 100	4,450	8,780	1.97	2.27
February	31,400	5,020	14,000	3.15	3.28
March	37,300	5,020	15,100	3.39	3.91
April	13,100	5,620	7,000	1.57	1.75
May	27,700	5,930	11,300	2.54	2.93
June	21,700	5,320	8,290	1.86	2.08
July					
August					
September	6,240	2,200	3,210	.721	.80
October	2,650	1,770	2,160	.485	.50
November	5,320	1,980	2,540	.571	.64
December	9,280	2,890	5,050	1.13	1.30

DAVIDSON RIVER NEAR DAVIDSON RIVER, N. C.

LOCATION. At English bridge, 4 miles from Davidson River, Transylvania County, and 500 feet above mouth of Avery Creek.

Drainage Area. 31 square miles (measured on topographic map). Records Available. June 1, 1904 to June 30, 1909, when station was discontinued.

GAGE. Vertical staff fastened to a tree on left bank 40 feet below bridge.

DISCHARGE MEASUREMENTS. Made from highway bridge just above gage.
CHANNEL AND CONTROL. Channel is straight for 500 feet above and below station;
one channel at all stages. Right bank is high; left bank is low; neither is subject to overflow. Bed composed of boulders and gravel; is clear and practically permanent.

EXTREMES OF DISCHARGE. Maximum stage recorded, 4.10 feet January 22, 1906 (discharge, 2,360 second-feet); minimum stage, 0.70 foot September 2, 6, 7, 21, 1907 (discharge 32 second-feet).

ICE. No ice affect during period of record.

REGULATION. None.

ACCURACY. Stage-discharge relation practically permanent. One rating curve used; well defined below 1,200 second-feet and extended above. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good except for extremely high stages.

COOPERATION. Station established in coöperation with the Biltmore estate.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF DAVIDSON RIVER NEAR DAVIDSON RIVER, N. C.

	Year										
Week	1904	1905	1906	1907	1908						
1		78	277	146	146						
2		233	131	102	256						
3		104	117	90	154						
4		76	699	79	123						
5		69	187	88	130						
6		120	134	94	113						
7		158	119	73	491						
8		183	143	71	200						
		129	159	111	167						
9		140	135	88	148						
10			153	85	134						
11		126 113	173	68	213						
		94	239	71	152						
13		90	156	97	12:						
14		119	177	78	12:						
15		90	159	82	14:						
16		85	116	107	238						
17		128	102	120	13						
18		129	87	123	18						
20		105	76	90	14						
		134	126	106	11-						
21		128	126	144	12						
22	81	80	175	115	10						
23	75	85	665	70	12						
24	66	125	237	60	9						
25	58	112	146	60	7						
27	49	118	201	44	20						
28	55	502	199	61	12						
29	58	190	303	65	8						
30	57	122	225	76	8						
31	71	96	181	44	8						
32	125	247	154	59	9						
33	89	202	188	57	. 7						
34	141	125	180	52	44						
35	137	99	223	38	18						
36	. 82	81	274	39	16						
37	. 72	68	160	43	10						
38	. 55	. 59	550	176	8						
39	. 50	50	493	87	8						
40	. 44	47	733	55	6						
41	. 40	66	271	45	9						
42	. 38	46	218	38	6						
43	. 38	46	160	42	14						
44	. 53	44	127	50	20						
45	46	44	106	40	8						
46	52	39	249	51	8						
47	. 38	42	297	170	7						
48	. 39	38	131	87	6						
49	65	142	114	89	10						
50	45	122	139	170	10:						
51	44	124	127	187	12						
52	- 88	106	262	237	110						

Monthly Discharge of Davidson River Near Davidson River, N. C. [Drainage area, 31 square miles]

			Discharges in Second-feet					
	Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inche		
	1904							
une		111	52	73	2.35	2.		
		90	38	55.4	1.79	2.		
			60	117	3.77	4.		
			44	67.3	2.17	2.		
-		44	38	39.7	1.28	1.		
			38	47	1.52	1.		
		147	38	59.9	1.93	2.		
, , , , , , , , , , , , , , , , , , , ,	1905	111		00.0				
anuary		895	60	117	3.77	4.		
		295	60	140	4.52	4.		
			90	120	3.87	4.		
			79	95.9	3.09	3.		
			90	128	4.13	4.		
			60	94.1	3.04	3		
		1,220	90	227	7.32	8		
_			90	161	5.19	5		
			44	66.5	2.15	2		
			44	50.7	1.64	1		
			38	41.3	1.33	1		
December		345	38	118	3 .81	4		
The year	1906	1,220	38	. 113	3.66	49.		
ODMONY	1900	2,360	79	297	9.58	11.		
		193	100	130	4.19	4		
		460	100	177	5.71	6		
			111	152	4.90	5		
			60	102	3.29	3		
			90	293	9.45	10		
		555	122	226	7.29	8		
			122	182	5.87	6		
_		1,260	134	360	11.6	12		
			134	325	10.5	11.		
			100	191	6.16			
		430	100	162	5.23	6.		
The year		2,360	60	216	6.98	94		
	1907							
		210	70	101	3.26	3.		
		134	60	82.8	2.67	2.		
		210	60	85.5	2.76	3.		
pril			60	89.9	2.90	3.		
Iay		193	70	108	3.48	4.		
une		400	52	88.9	2.87	3.		
uly		147	44	60.4	1.95	2.		
		134	38	51.1	1.65	1.		
			32	82.7	2.67	2.		
-			38	44.1	1.42	- 1.		
				84.5	2.73	3.		
			60	166	5.35	6.		
	r	985		87.1	2.81	38.		

MONTHLY DISCHARGE OF DAVIDSON RIVER NEAR DAVIDSON RIVER, N. C .- Continued

		Discharges in Second-feet					
${f Month}$	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches		
1908							
January	520	100	163	5.26	6.06		
February	1,460	100	237	7.65	8.25		
March	345	111	165	5.32	6.13		
April	625	100	156	5.03	5.61		
May	400	100	142	4.58	5.28		
June	210	70	102	3.29	3.67		
July	345	70	122	3.94	4.54		
August	940	70	185	5.97	6.88		
September	272	70	110	3.55	3.96		
October	660	60	114	3.68	4.24		
November	134	. 60	84.6	2.73	3.05		
December	295	60	106	3.42	3.94		
The year	1,460	60	141	4.54	61.61		

DAVIDSON RIVER NEAR BREVARD, N. C.

LOCATION. At steel highway bridge on road from Brevard to Mount Pisgah, 500 feet downstream from boundary line of Pisgah National Forest, 1½ miles upstream from junction of Davidson and French Broad rivers, 2 miles downstream from mouth of Avery Creek, 2½ miles downstream from site of old gaging station which was discontinued in 1909, and 5½ miles northeast of Brevard, Transylvania County.

Drainage Area. 41 square miles (measured on topographic map). Records Available. December 10, 1920 to December 31, 1923.

Gage. Enameled staff gage bolted to left bank pier of steel bridge; read by Mrs. U. G. Reeves.

DISCHARGE MEASUREMENTS. Made from upstream side of single-span steel bridge to which gage is attached.

CHANNEL AND CONTROL. Channel is straight 600 feet above and 50 feet below

gage. Bed of stream consists of gravel and is shifting. Both banks are high and are rarely overflowed. Nearly all floods are sharp and extend over very short periods. Control is a rock ledge covered with boulders forming a riffle 20 feet below gage. During flood of December 17, 1921, it is believed that a shift occurred in the control as stage-discharge relation after that date was changed.

Extremes of Discharge. 1920-1923: Maximum stage recorded, 7.5 feet at 7:30 a.m. December 14, 1920 (estimated discharge, 2,360 second-feet); minimum stage recorded, 0.54 foot at 7:00 a.m. and 6:00 p.m. November 21 to 26, 1922 (discharge, 37 second-feet).

ICE. Stage-discharge relation rarely if ever affected by ice.

REGULATION. None. ACCURACY. Stage-discharge relation shifted once. Rating curve is well defined between 45 and 400 second-feet; above that point curve is extended. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF DAVIDSON RIVER NEAR BREVARD, N. C.

Week 1920	1921		1922	1923
		133	94	174
		205	133	81
3		177	235	72
1		135	243	106
5		129	169	124
3		259	185	164
7		209	252	16
8		229	162	90
9		144	256	9
0		125	278	100
1		113	258	32
2		139	212	24
3		132	405	15
4		109	315	17 21
5		112	233	17
6		327	222	13
7		162	185	20
9		136	222	17
20		178	250	28
21		239	272	22
12		125	234	58
13		121	236	27
24		129	178	. 17
25		116	221	15
26		178	133	13
27		117	158	11
28		183	128	
29		190	134	10
30		169	129	8
81		164	91	9
32		131	86	14
33		143	81	
34		139	66	National State
35		110	61	
36		96	51	9
37		82	48	
38		91	47	13
39		86	50	
10		71	51	
11		57	67	
12		52	55	
13		50	46	
14		84 67	39	
16		75	39	
17		140	38	
18		159	41	
9		115	49	1
60	310	75	69	10
1	225	223	181	15
2	199	146	98	9

MONTHLY DISCHARGE OF DAVIDSON RIVER NEAR BREVARD, N. C. [Drainage area, 41 square miles]

		Discharges in	Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1920					
December 10-31	1,160	99	243	5.93	4.86
1921					
January	490	118	160	3.90	4.50
February	520	118	208	5.07	5.28
March	182	102	128	3.12	3.60
April	855	88	175	4.27	4.76
May	430	118	170	4.15	4.78
June	280	97	134	3.27	3.65
July	340	100	162	3.95	4.55
August	220	100	140	3.41	3.93
September	134	68	89.7	2.19	2.44
October	170	50	61.6	1.50	1.73
November	325	52	92.7	2.26	2.52
December	520	70	150	3.66	4.22
The year	855	50	139	3.39	45.96
1922					4.00
January	770	88	173	4.22	4.86
February	480	136	193	4.71	4.90
March	700	171	292	7.12	8.21
April	510	171	240	5.85	6.53 7.11
May	570	159	253	6.17	5.52
June	390	126	203	4.95	3.79
July	195	101	135	3.29 1.85	2.13
August	98	55	75.7	1.85	1.36
September		42	50.2	1.22	1.51
October	117	40	53.6 39.0	.951	1.06
November	43 665	37 41	96.1	2.34	2.70
					40.00
The year	770	37	150	3.66	49.68
January	420	66	111	2.71	3.12
February	300	80	135	3.29	3.43
March		84	195	4.76	5.49
April	390	126	175	4.27	4.76
May	1,300	117	293	7.15	8.24
June	450	108	209	5.10	5.69
July	159	75	100	2.44	2.81
August		64	100	2.44	2.81
September		53	86.1	2.10	2.34
October	93	46	52	1.27	1.46
November	315	46	73.2	1.79	2.00
December	315	78	120	2.93	3.38
The year	1,300	46	137	3.35	45 .53

LITTLE RIVER AT CALHOUN, N. C.

LOCATION. At highway bridge one-fourth mile west of Calhoun, Transylvania County, half a mile above mouth of river.

RRAINAGE AREA. 59 square miles (measured on topographic map).

Decords Available. July 19, 1904 to June 30, 1908 when station was discontinued. Discharge measurements only, before May 1, 1907.
Gage. Assumed to have been vertical staff. Different datums for records before

and after May 1, 1907.

DISCHARGE MEASUREMENTS. Made from upstream side of bridge.
CHANNEL AND CONTROL. Channel curved 75 feet above and 100 feet below station; one channel at all stages. Both banks high and not subject to overflow.

Bed composed of rock and sand.

Extremes of Discharge. Maximum stage recorded, 10.0 feet February 15, 1908 (discharge from extension of rating curve, 2,190 second-feet); minimum stage, water level below gage October 14 to November 1 (discharge estimated 46 second-feet).

REGULATION. Probably none.

ACCURACY. Stage-discharge relation practically permanent except possibly at highest stages, when there may be backwater from French Broad River. One rating curve used; well defined below 450 second-feet, and extended above. Gage read to half-tenths, probably once daily. Daily discharge ascertained by applying gage height to rating table. Records of discharge below 600 second-feet, good; those for high stages fair.

Cooperation. Station established and maintained in coöperation with United

States Forest Service.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF LITTLE RIVER AT CALHOUN, N. C.

	Ye	ar		Year		
Week			Week			
	1907	1908		1907	1908	
		292	27	78		
		589	28	102		
		286	29	88		
		184	30	78		
		191	31	62		
		279	32	80		
		1,051	33	92		
		360	34	80		
		359	35	52		
		235	36	64		
		211	37	52		
		491	38	182		
		286	39	102		
		206	40	77		
		241	41	63		
		320	42	46		
		406	43	46		
		366	44	65		
	171	221	45	70		
	128	220	46	106		
	127	170	47	448		
	175	136	48	153		
	133	153	49	121		
	106	131	50	628		
	97	109	51	443		
	141		52	493		

MONTHLY DISCHARGE OF LITTLE RIVER AT CALHOUN, N. C. [Drainage area, 59 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907					
May	230		139	2.36	2.72
June	410	83	134	2.27	2.53
July	185	51	86.0	1.46	1.68
August	137	51	74.7	1.27	1.46
September	951	51	96.8	1.64	1.83
October	131		56.9	.964	1.11
November	897		184	3.12	3.48
December 1908	1,700	95	404	6.85	7.90
January	1,680	171	322	5.46	6.30
February		185	495	8.39	9.05
March		171	306	5.19	5.98
April		157	298	5.05	5.68
May		137	223	3.78	4.36
June	280	83	123	2.08	2.32

SOUTH FORK OF MILLS RIVER NEAR SITTON, N. C.

LOCATION. At Sycamore church, 1 mile below Sitton, Henderson County. Drainage Area. 40.5 square miles (measured on topographic map). Records Available. June 1, 1904 to June 30, 1909, when station was discon-

tinued.

GAGE. Vertical staff fastened to tree on right bank 200 feet above ford. Datum of gage reported to have changed, but corrections have been made to readings DISCHARGE MEASUREMENTS. Made from foot log 40 feet below gage.

CHANNEL AND CONTROL. One channel at all stages; curved for 500 feet above and straight for 200 feet below station. Bed composed of rock; fairly permanent. Both banks high and clear; subject to overflow at high stages.___

EXTREMES OF DISCHARGE. Maximum stage recorded, 6.1 feet February 15, 1908 (discharge 1,780 second-feet); minimum stage, 0.7 foot Cctober 14-26, 28-31, November 1, and December 14, 1904 (discharge, 33 second-feet).

REGULATION. Probably none.

Accuracy. Stage-discharge relation not permanent. Two rating curves used as follows: June 1, 1904 to January 31, 1906, fairly well defined below 300 second-feet; February 1, 1906 to June 30, 1909, well defined below 400 second-feet and fairly well defined between 400 and 1,000 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. There is some uncertainty regarding the stability of gage during latter part of record. Records fair.

COOPERATION. Station established in cooperation with the Biltmore estate.

Mean Weekly Discharge, in Second-feet, of South Fork, Mills River Near Sitton, N. C.

	Year									
Week	1904	19	005	1906	1907	1908	1909			
1				240		100				
			85	310	194	168	145			
2			271	170	140	284	118			
3			127	146	127	177	153			
4			87	717	111	134	112			
5			87	229	112	133	104			
6			187	148	115	111	131			
7			178	133	100	562	161			
8			202	128	96	260	267			
9			164	168	147	224	215			
10			182	165	116	192	173			
11			159	169	109	163	187			
12			152	221	94	226	187			
13			110	263	96	167	219			
14			105	184	118	131	145			
15			136	216	108	130	166			
16			109	185	103	143	136			
17			98	137	141	221	121			
18			147	125	194	154	194			
19			151	105	167	193	239			
20			133	90	127	143	161			
21			158	137	171	119	294			
22			203	156	197	104	222			
23	98		105	227	152	103	421			
24	80		175	790	115	96	234			
25	74		169	284	122	89	170			
26	103		150	184	133	72	228			
27	60		161	163	99	201				
28	74		593	191	88	161				
29	70		288	293	93	90				
30	62		170	194	92	109				
31	64		127	160	71	100				
32	130		221	130	75	110				
33	99		179	166	73	95				
34	98		180	235	65	565				
35	113		139	357	49	238				
36	108		111	298	57	205				
37	72		86	192	52	122				
38	49		83	613	177	93				
39	46		68	493	91	95				
40	40		66	822	61	76				
41	39		96	359	56	109				
42	33		65	291	48	74				
43	34		63	227	49	186				
44	51		60	179	64	271				
45	51		57	152	55	131				
46	55		54	258	63	114				
47	45		52	394	221	97				
48	43		46	189	110	97				
49	67		206	162		170				
50	44		148	172	93 201	170				
51	61					142				
52	82		155 136	163 223	203 235	142				
					730	140				

Monthly Discharge of South Fork of Mills River Near Sitton, N. C. [Drainage area, 40.5 square miles]

	The Control of the Sales Sales Sales Sales	Discharges	in Second-fee	et	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1904					
June	221	62	90.7	2.24	2.50
July	173	46	66.4	1.64	1.89
August	262	54	104.0	2.57	2.96
September	290	46	70.9	1.75	1.95
October	40	33	36.2	.894	1.03
November	130	33	50.8	1.25	1.40
December 1905	162	33	63.1	1.56	1.80
January	920	54	137	3.38	3.90
February	366	80	172	4.25	4.43
March	276	. 99	154	3.80	4.38
April	196	90	112	2.77	3.09
May	382	99	161	3.98	4.59
June	516	80	142	3.51	392
July	1,500	130	294	7.26	8.37
August	482	109	174	4.30	4.96
September	140	. 62	89.7	2.21	2.47
October	234	62	71.4	1.76	2.03
November	62	46	53.5	1.32	1.47
December	. 516	46	153.0	3.78	4.36
The year	1,500	46	143	3:53	47.97
1906					
January	1,650	109	331	8.17	9.42
February	214	115	142	3.51	3.66
March	452	115	203	5.01	5.78
April	418	125	181 118	4.47 2.91	4.99 3.36
May	339 1,660	77 105	358	8.84	9.86
July	386	125	205	5.06	5.83
August	556	105	209	5.16	5.95
September	1,270	168	391	9.65	10.77
October	1,430	190	402	9.93	11.45
November	962	136	243	6.00	6.69
December	664	125	181	4.47	5.15
The year	1,660	77	247	6.10	82 .91
1907 January	268	105	139	3.43	3.95
February	146	86	106	2.62	2.73
March	296	86	113	2.79	3.22
April	214	86	118	2.91	3.25
May	452	105	165	4.07	4.69
June	354	96	144	3.56	3.97
July	125	68	92.9	2.29	2.64
August	105	51	66.8	1.65	1.90
September	1,000	36	90.9	2.24	2.50
October	77	44	53.2	1.31	1.51
November	402	51	108.0	2.67	2.98
December	628	68	179.0	4.42	5.10
The year	1,000	36	115	2.83	38.44

MONTHLY DISCHARGE OF SOUTH FORK, MILLS RIVER NEAR SITTON, N. C .- Continued

		t			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1908					
January	628	105	183.0	4.52	5.21
February	1,780	105	276.0	6.81	7.34
March	324	146	194.0	4.79	5.52
April	452	105	157	3.88	4.33
May	339	105	146	3.60	4.15
June	115	60	91.4	2.26	2.52
July	402	60	137.0	3.38	3.90
August	1,080	68	231	5.70	6.57
September	370	86	131	3.23	3.60
October	521	68	137	3.38	3.90
November	214	86	120	2.96	3.30
December	486	86	143	3.53	4.07
The year	1,780	60	162	4.00	54.41
1909					
January		96	129	3.19	3.68
February		86	184	4.54	4.73
March		125	189	4.67	5.38
April		115	144	3.56	3.97
May		115	217	3.97	6.18
June	1,160	146	292	7.21	8.04

NORTH FORK OF MILLS RIVER AT PINKBED, N. C.

Location. At highway bridge in Pinkbed, Henderson County, three fourths of a mile below postoffice and 1 mile above junction of north and south forks of

Drainage Area. 24 square miles (measured on topographic map).

RECORDS AVAILABLE. April 21, 1904 to June 30, 1909, when station was discon-

Gage. Vertical staff fastened to log crib on right bank at upstream side of bridge. DISCHARGE MEASUREMENTS. Made from bridge.

CHANNEL AND CONTROL. One channel at all stages; straight for 200 feet above and below station. Banks are high and not subject to overflow. Bed composed of loose rock; not permanent.

EXTREMES OF DISCHARGE. Maximum stage recorded, 4.0 feet July 12, 1905 and January 22, 1906 (discharge, 1,150 second-feet); minimum stage, 0.45 foot September 29, 30, October 1-31, November 1, 2, 9-12, 24-30, December 1, 2, 19, and 23, 1904 (discharge, 16 second-feet).

ICE. Stage-discharge relation not affected by ice.
DIVERSIONS. Subsequent to period of record, city of Hendersonville has drawn its water supply from the upper end of this stream. A 12 inch cast-iron pipe is used.

REGULATION. None.

Accuracy. Stage-discharge relation not permanent. Two rating curves used as follows: June 1, 1904 to October 31, 1906, well defined below 100 second-feet and fairly well defined between 100 and 400 second-feet; November 1, 1906 to June 30, 1909, fairly well defined below 250 second-feet. Gage read to half-tenths once deally. Daily discharge ascertained by applying gage height to tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records for low and medium stages, good; others, fair.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF NORTH FORK, MILLS RIVER AT PINKBED, N. C.

		Year						
Week	1904	1905	1906	1907	1908	1909		
		0.2		0.7				
1		35	151	85	69	78		
2		111	82	65	100	68		
3		47	76	62	72	85		
		45	408	55	63	60		
5		29	127	55	65	6		
		39	88	58	63	7		
7		54	74	52	291	9		
8		82	73	51	105	13		
9		73	82	59	92	- 10		
0		76	74	55	80	9		
1		68	80	54	68	10		
12		64	107	9 47	75	10		
3		52	126	46	79	13		
		45	98	65	67	9		
15		64	98	55	67	10		
16		55	104	58	66	8		
17		50	76	64	113	7		
		62	66	94	74	8		
19		66	61	78	86	15		
20		65	47	65	75	10		
1		67	66	66	63	14		
22		71	62	72	58	11		
23	40	50	71	67	56	22		
24	31	77	457	54	54	12		
25	38	91	154	54	44	11		
26	29	82	97	52	37	11		
27		78	78	45	68	-		
	21		85	45	69			
28	34	351 142	128	40	42			
29	26	93	88	41	49			
30	25		77	42	57			
31	32	74		30	59			
32	61	90	72	31	46			
33	40	96	74		141			
34	30	84	71	34	94			
35	33	72	144	26	73			
36	33	59	114	25				
37	26	51	95	28	55			
38	21	46	281	65	46			
39	19	45	238	40	48			
10	16	45	432	30	40			
11	16	50	187	28	48			
42	16	41	145	28	36			
43	16	38	115	28	58			
44	23	38	84	33	187			
45	22	36	70	28	66			
46	26	29	69	32	61			
47	19	32	158	64	54			
48	16	28	81	.43	48			
49	25	82	71	37	75			
50	21	68	66	71	62			
51	22	78	66	97	74			
52	33	68	77	83	70			
04	00	08	1 "					

Monthly Discharge of North Fork of Mills River at Pinkbed, N. C. [Drainage area, 24 square miles]

	1	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1904					
June	55	24	35.9	1.50	1.6
July	55	20	26.5	1.10	1.2
August	112	24	40.6	1.69	1.9
September	55	16	24.8	1.03	1.1
October	16	16	16.0	.667	.7
November	65	16	21.9	.912	1.0
December	65	16	24.7	1.03	1.1
1905					
January	432	24	56.9	2.37	2.7
February	112	24	55.6	2.32	2.4
March	112	50	66.2	2.76	3.1
April	103	42	53.3	2.22	2.4
May	96	50	67.4	2.81	3.2
June	179	42	71.0	2.96	3.8
July	1,150	65	160	6.67	7.6
August	158	65	84.3	3.51	4.0
September	70	42	51.9	2.16	2.4
October	103	37	43.5	1.81	2.0
November	37	28	32.1	1.34	1.5
December	202	28	71.0	2.96	3.4
The year	1,150	24	. 67.8	2.82	38.8
1906	1 170		177	7 00	
January	1,150	55	175	7.29	8.4
February	129	65	83.2 94.6	3.47 3.94	3.0 4.5
March	202	60	94.0	3.94	4.4
April	202 158	70 37	59.7	2.49	2.
May June	1.000	55	185.0	7.71	8.
July	1,000	70	93.2	3.88	4.
August	202	65	85.7	3.57	4.
September	700	82	178.0	7.42	8.
October	700	02	208.0	8.67	10.
November	409	64	93.2	3.88	4.3
December	168	64	70.8	2.95	3.
The year	1,150	37	118	4.93	67.0
1907	113	E4	65.4	2.72	3.
January	64	54 50	53.8	2.72	2.3
February	74	45	52.0	2.24	2
			60.5	2.52	2.8
April	113 148	50 54	74.6	3.11	3.5
May		45	60.2	2.51	2.8
JuneJuly	113 54	36	43.7	1.82	2.3
August	45	24	32.0	1.82	1.8
September	301	24	38.3	1.60	1.3
October	301	28	28.5	1.19	1.
November	106	28	42.1	1.75	1.
December	371	36	70.3	2.93	3.3
	971	0.4	51.8	2.16	29.:
The year	371	24	51.8	2.10	29.

MONTHLY DISCHARGE OF NORTH FORK MILLS RIVER AT PINKBED, N. C.-Continued

	1	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1908					
January	301	54	74.5	3.10	3.57
February	775	59	133	5.54	5.98
March	92	64	77.2	3.22	3.71
April	286	54	78.2	3.26	3.64
May	130	54	72.6	3.02	3.48
June	64	36	48.5	2.02	2.25
July	130	36	58.0	2.42	2.79
August	301	40	80.3	3.35	3.86
September	113	45	56.3	2.35	2.62
October	626	36	78.5	3.27	3.77
November	106	45	62.5	2.60	2.90
December	168	45	68.4	2.85	3.29
The year	775	36	74.0	3.08	41.86
January	. 130	64	72.6	3.02	3.48
February	214	54	96.6	4.02	4.19
March	214	85	109	4.54	5.28
April		69	88.9	3.70	4.18
May	The state of the s	74	122	5.08	5.86
June	626	92	145	6.04	6.74

MUD CREEK AT NAPLES, N. C.

Location. At wooden highway bridge half a mile east of Naples, Henderson County.

Drainage Area. 112 square miles (measured on topographic maps). Records Available. May 10 to December 31, 1907, when station was discontinued.

GAGE. Vertical staff fastened to downstream side of bridge. DISCHARGE MEASUREMENTS. Made from the bridge.

CHANNEL AND CONTROL. Both banks are high but will be overflowed at high stages.

CHANNEL AND CONTROL. Both banks are high but will be overflowed at high stages. Bed composed of sand; shifts somewhat.

Extremes of Discharge. Maximum stage recorded, 8.5 feet December 14 (discharge, 1,410 second-feet); minimum stage, 1.1 feet September 17, October 15, 28, and December 6 (discharge, 30 second-feet).

ICE. No ice affect during period of record.

Accuracy. Stage-discharge relation practically permanent. One rating curve used, fairly well defined above 60 second-feet; extension below may be poor. Gage read probably to tenths once a day. Daily discharge ascertained by applying gage height to rating table. Records fair.

Cooperation. Station maintained in cooperation with United States Forest Service

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MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF MUD CREEK AT NAPLES, N. C.

\$	Year		Year		Year
Week	1	Week		Week	
	1907		1907		1907
20	146	31	113	42	49
21	203	32	105	43	53
22	274	33	97	44	48
23	234	34	96	45	78
24	169	35	51	46	119
25	152	36	76	47	497
26	149	37	70	48	152
27	125	38	109	49	122
28	89	39	138	50	807
29	99	40	75	51	459
30	89	41	74	52	592

MONTHLY DISCHARGE OF MUD CREEK AT NAPLES, N. C. [Drainage area, 112 square miles]

]				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907					
May 10-31	490	120	184	1.64	1.34
June	550	120	197	1.76	1.96
July	172	82	103	.92	1.06
August	136	37	94.5	.844	.97
September	510	30	94.5	.844	.94
October	94	30	62.3	.556	.64
November	910	37	198	1.77	1.98
December	1,410	30	471	4.21	4.85

SWANNANOA RIVER AT SWANNANOA, N. C.

LOCATION. At iron highway bridge, one-fourth of a mile from the railroad station at Swannanoa, Buncombe County, 2 miles below North Fork and 2 miles above Beetree Creek.

Drainage Area. 60 square miles (measured on topographic map).

RECORDS AVAILABLE. May 28, 1907 to June 30, 1909, when station was discontinued.

Vertical staff in two sections, lower section fastened to tree on right bank 50 feet above bridge and upper section fastened to pile foundation of store on right bank, 5 feet below bridge.

DISCHARGE MEASUREMENTS. Made from highway bridge. CHANNEL AND CONTROL. Bed composed of sand and gravel. Banks high but

may be overflowed at extremely high stages.

Extremes of Discharge. Maximum stage recorded, 7.8 feet February 15, 1908 (discharge beyond limits of rating curve); minimum stage, 1.1 feet August 3C, September 1, 2, 20-22, October 22-24, and November 2-4, 1907 (discharge, 30 second-feet).

ICE. No ice affect during period of record.

Accuracy. Stage-discharge relation assumed not permanent. Two rating curves used, as follows: May 28, 1907 to December 31, 1908, fairly well defined between 40 and 250 second-feet; January 1 to June 30, 1909, fairly well defined between 40 and 280 second-feet. High water portion of curves not developed. Gage probably read to tenths once a day. Daily discharge ascertained by applying gage height to rating table. Records good below 400 second-feet.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF SWANNANOA RIVER AT SWANNANOA, N. C.

Week 1907		Year			Year			
	1907	1908	1909	Week	1907	1908	1909	
					440	-110		
		128	174	27	118	142		
		132	166	28	99	129		
		142	159	29	151	67		
		107	129	30	84	91		
		88	115	31	109	110		
		97	118	32	66	118		
		325	149	33	61	86		
		252		34	55	120		
		153	216	35	35	226		
		164		36	41	148		
		181		37	42	97		
		228		38	33	74		
		181		39	63	64		
		. 120	211	40	52	56		
		101	198	41	39	206		
		145	167	42	36	76		
		188	135	43	35			
		131	208	44	35	276		
		140	192	45	44	148		
		134	192	46	55	146		
		129		47	105	107		
	157	163	280	48	84	92		
	166	107		49	55	133		
	113	88		50	208	123		
	125	72	246	51	128	141		
	229	58	211	52	283	164		

SWANNANOA RIVER AT BILTMORE, N. C.

Location. At Biltmore Avenue concrete bridge 600 feet upstream from Southern Railway bridge, 600 feet below the mouth of the Foster Mill Creek, 800 feet from Southern Railway station at Biltmore, Buncombe County, 1½ miles above junction of Swannanoa and French Broad rivers, and 2 miles south of center of Asheville.

Drainage Area. 128 square miles (measured on topographic maps). Records Available. December 1, 1920 to December 31, 1923.

GAGE. Enameled vertical staff attached to downstream end of bridge pier nearest right bank; read by Mr. W. M. Brown.

DISCHARGE MEASUREMENTS. Made from downstream side of bridge or by wading.

Channel and Control. Channel is straight for 300 feet above and below gage.

Bed consists of sand, gravel and boulders; probably permanent. Bridge has vertical concrete abutments and two concrete piers. Low-water channel is confined between two piers. Both banks are high and have never been known to have been overflowed except during the great flood of July 1916. Control is a rock ledge extending entirely across river making a sharp riffle 200 feet below gage; permanent except that trash sometimes lodges on top of riffle causing slight disturbance of stage-discharge relation. Great floods on French Broad River, 11/2 miles below, may cause backwater but there has been no backwater since this station was established.

EXTREMES OF DISCHARGE. 1920-1923: Maximum stage recorded, 8.2 feet at 6:00 p.m. May 29, 1923 (discharge, 6,240 second-feet); minimum stage, 1.00 foot at 4:30 p.m. November 11, 1922 (discharge, 20 second-feet).

ICE. Stage-discharge relation not affected by ice.

DIVERSIONS. The water supply for the city of Asheville is drawn from headwaters of Beetree Creek and North Fork, both tributaries of Swannanoa River. The amount diverted is said to be about 11 second-feet but has not been accurately measured. Practically the entire flow from 28 square miles is used during extreme low stages. Some of the water reënters the river above the gage.

REGULATION. During low water there will probably be diurnal fluctuation due to

operation of a small hydro-electric plant 3 miles upstream.

Accuracy. Stage-discharge relation practically permanent. Rating curve well defined below 1,300 second-feet; extended above that point. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF SWANNANOA RIVER AT BILTMORE, N. C.

	- 1	7	Tear	
Week	1920	• 1921	1922	1923
		150	100	
		156	106	4
		238	131	1
		252	319	
		192	289	1
		238	151	3
		632	249	3
		374	464	2
• • • • • • • • • • • • • • • • • • • •		368	209	
		214	293	1
•		169	280	2
		147 224	428	
			448	
		197 177	412	
		149	275	
		509	285	
		282	216	
		241	285	
		241	228	
		255	299	
		368	279	
• • • • • • • • • • • • • • • • • • • •			279	
		179	220	
		236	138	
		198	216	
		155 146	87	
		104	88	
		113		
		195	217	
		182	132	
		105		
		107	76	
		161	91	
		107		
		74	60	
		74		
		115		
		65		
		59		
		63		
		60		
***************************************		60		
*******************		69		
		159	59	
		106		
		103		
,		141		
		173	50	
)	183	156	79	
)	422	103		
	217	147		
?	244	108	117	

Monthly Discharge of Swannanoa River at Biltmore, N. C. [Drainage area, 128 square miles]

Month	Disch	narges in Second-fe	et
	Maximum	Minimum	Mean
1920	1.410	100	0.5
December	1,410	100	257
January	440	132	209
February	1,680	200	403
March	380	132	187
April	1.320	132	273
May	650	186	266
June	550	132	183
July	420	72	144
August	218	70	114
September	482	46	77.
October	218	50	72.
November	218	83	133
December	254	89	132
The year	1,680	46	183
1922			
January	1,240	83	205
February	1,160	135	272
March.	760	168	353
April	760	178	299
May	528	148	266
June	550	72	178
July	344	72	132
August	116	54	74.
September	92	43	54.
October	272	43	80.
November	62	26	56.
December	650	59	150
The year	1,240	26	177
January	1,320	86	205
February	705	110	243
March	1,160	113	332
April	528	148	205
May.	2,830	151	433
June	625	119	231
July	440	60	142
August	175	61	91.
September	362	59	102
October	106	48	65.
November	126	59	81.
December	254	103	136
The year	2,830	48	189

IVY RIVER AT DEMOCRAT, N. C.

At steel wagon bridge at Democrat, Bur combe County, about 4 miles above West Fork and 18 miles west of Asheville, N. C.

Drainage Area. About 164 square miles.

RECORDS AVAILABLE. May 27, 1907 to December 31, 1907, when station was discontinued.

GAGE. Rod gage in two sections; lower section spiked to willow tree on right bank about 150 feet below bridge, upper section attached to sycamore tree about

25 feet to right of lower one; read by W. R. Maney.

DISCHARGE MEASUREMENTS. Made from the wagon bridge.

CHANNEL AND CONTROL. Bed rocky and rough. Current irregular. Control not known. Both banks are high and not subject to overflow.

EXTREMES OF DISCHARGE. Maximum stage recorded, 3.8 feet September 23, 1907 (discharge not determined); minimum stage recorded, 0.6 foot September 14, 20 and 21 (discharge not determined).

ICE. Stage-discharge relation not affected by ice.

REGULATION. Some regulation caused by operation of mill above.

Accuracy. Stage-discharge relation shifts. Rating curve poorly defined. Gage read to tenths once daily. Records very poor.

Daily Discharge, in Second-Feet, of Ivy River at Democrat, N. C., for 1907

Day	May	June	July	August	Sept.	Oct.	Nov.	Dec.
			-	1000			•	p-4
1				70	32	43	32	43
2				70	32	43	43	43
3			88	55	32	43	55	43
4			88	55	32	43.	43	43
5			70	55	43	70	43	43
6		88	70	55	32	43	43	32
7		88	70	55	32	43	43	32
8			70	55	55	43	43	43
9			70	55	43	43	43	70
10			55	55	43	32	70	
11			55	43	55	32	70	
12				55	32	32	55	70
13				70	32	32	55	70
14			88	55		32	55	
15			70	55	32	32	43	
16		88	88	43	55	32	43	
17		88	88	43	32	32	43	70
18		70		88	32	32	70	70
19		70		70	32	43	55	70
20	2.2			70		32	55	. 70
21		. 88	88	55		32	88	70
22		70	70	43	43	32	70	70
23		88	70	43	1	43	88	
24		1.40	88	55	88	43		
25		1	88	43	70	43	70	
26			70	43	43	32	70	88
27	70		70	32	43	43	70	88
28	70		70	32	43	55	70	88
29	55		70	43	70	55	55	88
30	55	4 10 5		43	43	43	55	
31	70		88	55	10	43		

PIGEON RIVER AT CANTON, N. C.

- Location. At highway bridge 1,000 feet above Southern Railway bridge at Canton, Haywood County.
- Drainage Area. 134 square miles (measured on topographic maps).
- RECORDS AVAILABLE. May 25, 1907 to June 30, 1909, when station was discontinued.
- GAGE. Vertical staff on left bank 50 feet above bridge.
- DISCHARGE MEASUREMENTS. Made from highway bridge.
 CHANNEL AND CONTROL. Bed composed of sand. Conditions of control not known, though a low dam one-fourth of a mile below may have had some
- EXTREMES OF DISCHARGE. Maximum stage recorded, 7.7 feet February 15, 1908 (discharge, 3,650 second-feet); minimum stage, 2.5 feet August 26-31, September 1-7, 10-20, October 13-27, 1907 (discharge, 165 second-feet).
- Accuracy. Stage-discharge relation permanent. Rating curve used, fairly well defined below 700 second-feet, and extended above. Gage read probably to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good between 200 and 700 second-feet, fair below and probably fair above.
- Cooperation. Station established in cooperation with United States Forest Service.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF PIGEON RIVER AT CANTON, N. C.

		Year			Year			
Week	1	1		Week				
1907	1907 1908 1909		1907	1908	1909			
	-	419	524	27	203	346		
2		569	394	28	192	307		
3		374	483	29	213	220		
		278	343	30	155	218		
5		300	290	31	132	201		
3		293	552	32	130	246		
7		1,097	777	33	132	214		
3		412	887	34	128	585		
)		344	593	35	105	391		
)		377	1,150	36	113	362		
		375	920	37	105	249		
2		547	675	38	401	196		
3		409	771	39	211	175		
		295	479	40	159	163		
5		253	416	41	121	313		
3		352	409	42	105	229		
		568	365	43	111	594		
3		370	569	44	139	629		
)		401	379	45	154	374		
)		308	497	46	130	335		
		261	987	47	337	295		
2	289	235	623	48	221	265		
3	275	268	1,373	49	165	459		
	229	265	546	50	335	409		
	220	252	388	51	377	373		
	224	205	366	52	439	387		

MONTHLY DISCHARGE OF PIGEON RIVER AT CANTON, N. C. [Drainage area, 134 square miles]

]	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907		~			
June	417	205	248	1.85	20.6
July	300	150	189	1.41	1.63
August	162	105	125	.933	1.08
September	2,100	105	201	1.50	1.67
October	175	105	125	.933	1.08
November	570	125	203	1.51	1.68
December	1,100	150	324	2.42	2.79
1908		100			2.13
January	960	265	398	2.97	3.42
February	3,650	265	526	3.93	4.24
March.	730	337	419	3.13	3.61
April	1.380	235	367	2.74	3.06
May	482	235	320	2.39	2.76
June	337	205	248	1.85	2.06
July	482	175	267	1.99	2.29
August	1,170	175	337	2.51	2.89
September	504	175	249	1.86	2.08
October	1,240	125	366	2.73	3.15
November	592	265	350	2.61	2.91
December	1,100	265	397	2.96	3.41
The year	3,650	125	354	2.65	35.88
	780	300	423	3.16	3.64
JanuaryFebruary	1,240	265	665	4.96	5.16
March	2,010	460	884	6.30	7.26
April.	614	337	423	3.16	3.53
May	1.850	337	602	4.49	5.18
June	3,320	337	690	5.15	5.75

PIGEON RIVER NEAR CRABTREE, N. C.

LOCATION. At steel highway bridge on road from Waynesville to Crabtree, 2 miles south of Crabtree, Haywood County and 5 miles northwest of Clyde. Crabtree Creek enters 1½ miles below.

Drainage Area. 244 square miles (measured on topographic maps). Records Available. December 16, 1920 to December 31, 1923.

GAGE. Chain gage attached to upstream handrail of bridge; read by Miss Mary Kinsland.

DISCHARGE MEASUREMENTS. Made from downstream side of bridge at gage.

Channel and Control. Channel straight for 200 feet above and 100 feet below gage. Bed composed of rock, gravel and sand; probably permanent. Right bank high; is seldom overflowed. Left bank high and not subject to overflow. Control is rock riffle 100 feet below gage; permanent except that at times debris may lodge on top of riffle.

EXTREMES OF DISCHARGE. Maximum stage recorded, 6.8 feet at 5 p.m January 21, 1922 (discharge, 6,250 second-feet); minimum stage, 1.1 feet at 8 a.m. November 21, 1922 (discharge, 14 second-feet), during filling of Lake Junaluska

after flushing it.

ICE. Stage-discharge relation not affected by ice.

REGULATION. A small mill at Clyde and others on tributaries cause slight diurnal fluctuation during low water, but as none of the plants have large storage the

effect on the records is slight.

Accuracy. Stage-discharge relation permanent except when changed by debris lodging on control Rating curves, well defined below 3,000 second-feet. Gage read to hundredths once daily prior to April 10, 1921, and thereafter twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF PIGEON RIVER NEAR CRABTREE, N. C.

	Year							
Week	1920	1921	1922	1923				
1		539	357	78				
2		685	453	42				
3		788	1,273	37				
4		534	1,028	58				
5		521	591	73				
6		1,056	719	92				
7		854	979	92				
8		1,024	750	49				
9		596	1,220	51				
0		497	1,278	58				
1		426	1,253	1,1				
2		477	935	89				
3	'	468	1,596	58				
4		388	1,091	59				
5		359	804	70				
6		764	833	65				
7		658	682	5				
8		516	769	6				
9		551	646	6				
0		516	685	7				
		1,201	729	7				
2		559	648	1,3				
3		480	- 595	7:				
4		482	447	70				
5		467	442	5				
6		499	447	6				
7		347	370	5				
8		417	457	4				
9		731	583	4'				
0		457	419	3.				
1		491	402	4				
2		350	302	3				
3		376	271	3:				
1		403	233	2				
5		301	198	23				
6		289	183	2-				
7		231	187	21				
8		206	194	2'				
9		275	222	18				
0		218	141	10				
1		169	180	10				
2		155	121	18				
3		133	135	10				
4		225	149	21				
5		208	139	25				
6		321	152	13				
7		399	121	1.				
8		429	153	25				
9		439	175	3'				
0		310	322	2'				
1	738	500	970	38				
2	861	460	399	3:				

Monthly Discharge of Pigeon River at Crabtree, N. C. [Drainage area, 244 square miles]

]				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1920					
December 16-31	1,720	525	811	3.32	1.97
1921					=====
January	1,300	430	631	2.59	2.99
February	2,360	400	870	3.57	3.72
March	625	340	467	1.91	2.20
April	1,400	312	551	2.26	2.52
May	2,800	460	691	2.83	3.26
June	880	370	485	1.99	2.22
July	1,300	302	485	1.99	2.29
August	960	252	383	1.57	1.81
September	400	166	255	1.05	1.17
October	310	64	176	.721	.83
November	635	170	310	1.27	1.42
December	932	280	435	1.78	2.05
The year	2,800	64	478	1.96	26.48
1922					
January	5,350	280	758	3.11	3.58
February	1,610	530	766	3.14	3.27
March	3,550	635	1,320	5.41	6.24
April	1,840	600	855	3.50	3.90
May	1,050	498	691	2.83	3.26
June	932	340	513	2.10	2 34
July	1,010	310	469	1.92	2.21
August	472 282	160	262 197	1.07	1.23
September	282	95	197	.586	
November	190	54	134	.549	.61
December	3,650	25	463	1.90	2.19
m	7.070	0.5	7.10		
The year	5,350	25	548	2.24	30.46
January	2,040	322	553	2.27	2.62
February	1,810	403	759	3.11	3.24
March	1,920	448	773	3.17	3.66
April	1,300	448	624	2.56	2.86
May	2,160	448	826	3.39	3.91
June	1,300	448	715	2.93	3.27
July	695	285	451	1.85	2.13
August	658	214	327	1.34	1.54
September	397	156	224	.918	1.02
October	241	140	169	,693	.80
November	585	103	191	.783	.87
December	775	187	327	1.34	1.54
The year	2,160	103	495	2.03	27.46

PIGEON RIVER AT NEWPORT, TENN.

LOCATION. At county highway bridge, 1 mile above railway station at Newport, Cocke County, 300 feet above Southern Railway bridge, and 6 miles above mouth of river.

DRAINAGE AREA. 655 square miles (measured on topographic maps).

RECORDS AVAILABLE. September 4, 1900 to December 31, 1923. During 19001902, records were fragmentary owing to disturbance of gage. No gage-height
record January 1 to November 30, 1906, and for short periods at other times.

GAGE. Wire gage was used from September 4, 1900 to April 30, 1903, on which

date it was replaced by standard chain gage, which has remained in use since. Datum of gage has remained unchanged.

DISCHARGE MEASUREMENTS. Made from highway bridge or from railway bridge 300 feet below. In 1963-04, some discharge measurements were made from

Deep Ford bridge, 3 miles below gaging station.

CHANNEL AND CONTROL. Bed of stream composed of solid rock overlain with shifting sand near right bank. Well defined control formed by rock ledge extending across river in front of sandbar island below Southern railway bridge and 500 feet below gage; probably permanent. Left bank is high rock cliff, right bank is overflowed above stage of 10 feet.

EXTREMES OF DISCHARGE. Maximum stage recorded, 17.0 feet at 5 a.m. April 2, 1920 (discharge more than 31,000 second-feet); minimum stage, C.4 foot Oc-

tober 3, 1919 (discharge, 102 second-feet).

ICE. Stage-discharge relation seldom affected by ice.

REGULATION. Operation of industrial plants at Hartford, Tenn., 18 miles upstream may have caused slight regulation of flow, but effect at gaging station is con-

sidered negligible.

Accuracy. Stage-discharge relation not permanent. Six rating curves used, as follows: September 5, 1900 to October 12, 1901, and March 3, 1903 to December 31, 1909, well defined between 250 and 9,000 second-feet; January 1, 1910 to September 30, 1918, fairly well defined below 10,000 second-feet. October 1, 1918 to February 10, 1921, fairly well defined between 300 and 5,000 second-feet; December 14, 1902 to February 6, 1903, and February 11, to September 30, 1921, fairly well defined between 500 and 6,000 second-feet; October 1, 1921 to September 30, 1922, and October 1, 1922 to December 31, 1923, well defined between 300 and 5,000 second-feet. Gage read to tenths and to be 15 to the properlying second feet. to half-tenths, probably once daily. Daily discharge ascertained by applying gage height to rating table. Records good for discharge between 300 and 5,000

Second-feet, others fair.

COOPERATION. Gage height record furnished by United States Weather Bureau

from December 1, 1906 to December 31, 1923.

Note. Breaks in the record since 1902 have been filled in by estimates derived from comparative mean daily discharge hydrographs using records of French Broad River at Asheville and of Little Tennessee River at Judson.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET

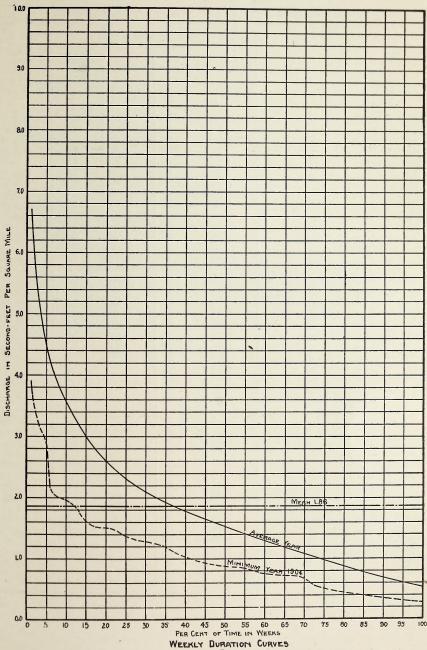
					Ye	ear			4 10	Married SI
Week										
	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911
					1 1		1 177		44 W	1. 1. 1. 1. 1. 2.
								**		
1		2,110	341	762	1,943	1,677	2,513	1,654	1,456	2,537
2		2,116	419	2,132	1,414	1,136	3,380	1,427	1,167	911
3	1	2,104	467	1,133	1,286	907	1,717	2,077	930	676
4		2,130	1,312	475	4,671	751	1,427	1,237	1,064	653
5		2,887	468	522	1,729	879	1,556	912	874	820
6		2,750	890	1,991	1,371	1,268	1,324	2,746	849	1,967
7	1	2,786	609	1,541	1,143	801	3,831	3,094	1,493	1,316
8		2,249	983	3,180	1,101	746	1,824	3,270	1,646	1,029
9		4,510	1,213	1,240	1,019	1,131	1,609	2,330	1,959	807
10	1	3,149	2,559	1,517	1,279	1,406	1,637	3,749	1,366	1,789
11		2,370	1,263	1,249	1,471	1,641	2,096	3,159	1,014	1,119
12		5,331	2,056	1,198	1,936	999	3,571	2,901	806	924
13		4,286	1,874	879	1,579	961	2,290	4,209	676	1,333
14		5,999	1,003	927	1,457	952	1,357	1,933	590	3,814
15		5,651	1,077	1,556	1,579	1,029	980	1,717	601	2,557
16		3,336	876	982	1,657	1,215	1,236	1,289	1,080	2,204
17		2,496	992	815	1,193	1,409	1,872	1,273	790	1,406
18		1,531	1,005	982	1,214	1,576	1,359	3,039	687	1,301
19		1,139	1,309	1,132	956	2,043	1,307	1,724	1,320	937
20		920	858	1,949	846	1,192	1,251	1,323	1,089	733
21		950	620	1,530	897	920	1,124	3,099	1,380	723
22		1,308	824	1,157	1,100	968	1,026	1,760	1,103	551
23		3,130	749	711	1,094	1,476	897	4,193	1,473	575
24		1,517	531	687	1,907	1,116	956	1,994	1,457	452
		1,119	574	983	1,514	779	767	1,536	1,024	411
26		935 789	675	1,002	1,271	1,415	662	1,697	1,044	421
28		739	563 835	670	1,136	905 783	1,270	2,284	1,326	457
29		861	471	3,124	1,264 2,643	901	1,045	2,583 1,207	1,377 1,330	711
30		541	548	1,171	1,700	583	639	1,207	889	529
31		693	493	909	1,379	676	629	1,628	1,054	641 487
32		586	706	695	1,097	562	1,054	1,028	781	506
33		1,110	572	1,188	1,471	566	645	2,264	571	471
34		504	550	1,012	1,486	646	2,095	1,046	804	291
35		374	492	725	2,829	376	1,079	841	1,213	763
36		330	492	547	1,771	637	855	658	1,213	602
37		289	319	435	1,350	407	491	706	687	465
38		399	251	437	2,971	680	341	718	541	378
39		252	229	350	2,943	949	430	1,068	650	686
40		226	209	359	4,757	630	334	658	647	436
41		350	196	390	2,357	476	829	769	604	624
42		300	181	388	1,857	371	334	1,212	444	1,183
43		251	184	400	1,579	340	1,037	636	388	544
44	\ \	268	202	350	1,207	484	1,853	581	435	388
45		296	273	349	997	668	789	560	435	516
46		499	255	296	1,063	685	869	500	373	734
47		404	284	364	3,229	1,736	622	473	330	810
48		331	323	311	1,248	1,000	749	425	541	734
49		289	661	1,855	1,027	584	2,357	588	1,292	561
50		334	350	997	982	1,267	1,764	1,142	608	488
51	1,816	553	243	1,025	1,427	1,001	1,275	794	646	1,199
52	2,140	420	805	996	2,032	1,586	1,911	763	881	1,683
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OF PIGEON RIVER AT NEWPORT, TENN.

						Year						-
1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	Tr 1
1,499	804	623	1,641	2,589	1,504	840	3,536	468	1,084	786	1,549	
900	880	496	2,064	2,069	1,161	2,746	1,271	522	1,768	928	1,089	
666	846	435	2,473	1,269	1,790	1,899	1,133	1,038	2,261	2,564	971	
560	2,281	380	2,143	1,373	1,943	2,931	2,741	2,633	1,247	3,361	1,849	
1,451	1,551	565	3,179	2,469	1,984	4,881	1,112	2,134	2,507	1,519	3,473	
829	1,100	1,273	2,453	1,896	2,384	1,636	951	1,931	3,541	1,999	3,226	
843	1,506	723	1,157	1,401	1,543	1,977	1,010	1,319	2,350	3,490	2,806	
1,690	967	1,067	969	1,086	3,087	1,546	1,997	1,399	2,654	1,721	1,296	
2,574	2,484	807	994	2,020	5,377	1,160	1,764	1,164	1,133	2,416	1,198 2,991	
1,719	1,201	733	1,017	1,786	5,940 3,936	1,054 951	3,039 1,386	1,279 4,293	886 1,015	2,826 3,011	4,394	
2,860 2,163	5,101 2,094	1,663 856	907 843	1,424 956	3,679	1,360	810	2,951	1,260	2,039	3,154	
4,346	6,594	1,346	924	910	4,211	1,300	1,195	3,199	1,269	2,759	1,460	
3,384	1,773	937	923	1,383	3,063	1,009	759	8,833	1,101	2,483	1,289	
1,423	1,859	1,117	1,044	1,407	2,380	1,653	1,044	2,306	834	1,833	1,694	
1,369	1,944	2,066	767	951	1,726	1,510	1,513	2,021	3,049	1,869	1,487	
2,056	1,206	943	883	856	1,439	1,037	1,029	1,604	1,634	1,814	1,411	
2,679	1,100	871	951	699	1,659	1,146	1,653	1,370	1,613	2,471	1,761	
1,977	770	873	1,760	560	1,404	1,187	984	1,234	1,439	2,671	1,601	1
1,163	866	561	1,086	677	1,114	1,251	908	928	1,283	1,876	1,730	
846	3,170	452	923	1,579	909	1,444	1,028	751	2,059	1,546	2,166	
1,021	2,063	444	1,526	1,707	909	1,301	1,014	636	1,457	1,440	2,497	
869	2,023	654	1,076	1,134	1,073	1,546	532	1,091	1,016	1,777	1,507	
807	971	420	1,081	2,296	1,109	999	552	565	1,065	1,580	1,604	
699	843	1,031	937	1,244	954	2,769	653	1,215	1,182	1,525	1,069	- 11
1,534	713	342	943	810	897	1,641	1,692	618	1,129	799	1,444	- 1
1,806	966	260	1,263	924	817	924	575	595	648 1,023	1,806 1,575	1,099 1,114	
1,721	586	444	1,117	4,200	751	784 561	828 1,486	656 876	2,384	1,999	1,119	
911	459 587	471 586	1,011 580	3,599 1,987	2,111 1,301	1,379	958	739	1,490	1,614	641	
934 1,199	636	558	523	1,186	1,343	1,520	507	583	1,397	809	705	- 1
643	800	336	636	2,057	884	1,081	804	1,286	1,069	906	1,121	
594	606	903	856	1,231	889	1,017	1,003	2,394	1,834	739	901	
543	550	374	914	773	764	774	449	1,479	1,251	472	640	0
404	543	567	576	613	1,464	654	318	1,373	1,221	499	524	1
359	483	299	842	429	1,147	821	228	836	1,136	454	473	
345	387	305	576	404	750	593	259	1,215	738	457	439	- 1
399	671	285	464	366	506	761	190	744	453	324	439	- 1
799	334	299	412	344	1,050	721	566	556	434	435	490	- 1
453	353	328	1,510	359	479	461	254	662	811	330	330	- 1
359	292	281	606	419	461	402	602	489	688	409	330	
612	299	2,245	771	637	876	410	552	394	436 403	366 313	319 313	
436	691	424	613	565	810	1,653	914 376	363 471	636	290	359	- 1
311	353	285	404	411 337	874 699	4,407 1,029	337	445	564	290	416	
594	430	334	344 670	411	580	1,029	452	791	999	301	337	- 1
396 311	495 412	661 545	871	380	590	1,059	299	1,055	1,154	296	404	
311	359	2,043	504	510	736	876	390	736	1,141	333	401	- 1
796	452	2,671	624	666	614	663	509	952	1,365	755	989)
479	486	1,213	713	896	560	1,356	2,349	3,364	627	1,380	801	1
396	444	744	4,410	733	574	3,984	734	1,674	1,346	2,297	671	
549	628	3,078	3,431	1,235	630	2,519	514	1,618	868	926	805	5

MONTHLY DISCHARGE OF PIGEON RIVER AT NEWPORT, TENN. (Drainage area, 655 square miles]

		Discharges i	n Second-fee	et	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1903					
January	2,210	2,070	2,120	3.24	3.74
February	13,000	1,500	3,070	4.69	4.88
March	16,400	1,710	3,740	5.71	6.58
April	17,400	1,710	4,270	6.52	7.27
May	1,710	890	1,120	1.71	1.97
June	6,950	890	1,680	2.56	2.86
July	1,100	490	737	1.13	1.30
August	1,990	365	668	1.02	1.18
September	675	220	321	.49	.55
October	758	220	279	.426	.49
November	995	260	376	.574	.64
December	758	205	391	.597	.69
The year	17,400	: 05	1,560	2.38	32.15
1904	0.000	160	624	0.53	1 10
January	2,880 2,140	395	853	.953 1.30	1.10
February	8,470	800	1,840	2.81	3.24
	1,850	715	1,000	1.53	1.71
April	2,140	490	915	1.40	1.71
May June	1,050	458	654	.998	1.01
July	1,520	365	596	.910	1.11
August	890	395	579	.884	1.02
September	560	220	329	.502	.56
October	220	175	192	.293	.34
November	490	190	266	.406	.45
December	2,580	190	516	.788	.91
The year.	8,470	. 160	697	1.06	14.50
1905					
January	6,000	260	1,070	1.63	1.88
February	6,000	425	1,910	2.92	3.04
March	3,190	800	1,210	1.85	2.13
April	1,990	715	1,070	1.63	1.82
May	4,020	800 560	1,390	2.12	2.44
June	1,780	560	863	1.32	1.47
July	10,900 2,880	525	1,410 1,060	2.15 1.62	2.48
August	675	310	457	.698	1.87
September	490	310	384	.586	.68
October	425	260	330	.504	.56
November	4,380	310	1,150	1.76	2.03
The year	10,900	260	1,020	1.56	21.18



WEEKLY DURATION CURVES
FOR
PIGEON RIVER AT NEW PORT, TENN
1903-1923

MONTHLY DISCHARGE OF PIGEON RIVER AT NEWPORT, TENN.—Continued

	1				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1906					
January	11,000	700	2,290	3.50	4.04
February	1,700	940	1,230	1.88	1.90
March	2,600	940	1,490	2.27	2.65
April	2,300	1,100	1,480	2.26	2.55
May	1,700	680	990	1.51	1.74
June	2,700	980	1,420	2.17	2.42
July	3,500	1,050	1,650	2.52	2.90
August	3,700	900	1,630	2.49	2.87
September	5,400	1,100	2,260	3.45	3.85
October	5,600	1,250	2,510	3.83	4.42
November	6,400	840	1,610	2.46	2.74
December	3,520	890	1,360	2.08	2.40
The year	11,000	700	1,660	2.53	34.48
1907	=====		====	2.00	01.10
January	2,580	715	1,080	1.65	1.90
February	1,990	560	950	1.45	1.51
March	2,280	715	1,250	1.91	2.20
April	1,710	800	1,160	1.77	1.98
May	2,880	715	1,360	2.08	2.40
June	3,680	715	1,210	1.85	2.06
July	1,220	490	801	1.22	1.41
August	995	310	566	.864	1.00
September	3,000	260	644	.983	1.10
October	740	310	443	.676	.78
November	4,020	350	983	1.50	1.67
December	3,350	490	1,100	1.68	1.94
The year	4,020	260	962	1 .47	19.95
1908 January	9,800	1,100	2,160	3.30	3.80
February	9,610	1,100	2,140	3.27	3.53
March	7,330	1,220	2,300	3.51	4.05
April	4,200	890	1,420	2.17	2.42
May	1,850	890	1,250	1.91	2.20
June	1,460	560	827	1.26	1.41
July	2,580	490	889	1.36	1.57
August	3,040	490	1,150	1.76	2.03
September	1,990	310	545	.832	.93
October	2,880	310	817	1.25	1.44
November	1,710	425	814	1.24	1.38
December	6,570	715	1,780	2.72	3.14
The year	9,800	310	1,340	2.05	27.90

MONTHLY DISCHARGE OF PIGEON RIVER AT NEWPORT, TENN.—Continued

		1	Discharges in	Second-feet		
3	Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
	1909					
January		3,520	890	1,540	2.35	2.71
February		8,090	715	2,690	4.11	4.28
March		9,040	1,850	3,340	5.10	5.88
April		2,880	1,100	1,570	2.40	2.68
May		7,900	1,220	2,260	3.45	3.98
June		11,300	1,340	2,330	3.56	3.97
July		5,640	995	1,770	2.70	3.11
August		4,380	800	1,470	2.24	2.58
September_		2,140	635	788	1.20	1.34
October		2,580	560	798	1.22	* 1.41
		560	425	503	.768	.86
December		2,730	425	794	1.21	1.40
The year	r	11,300	425	1,650	2.53	34.20
T	1910	* 000	¥40	4 400	4.50	4 00
		5,990	560	1,130	1.73	1.99
			560	1,230	1.88	1.96
			630	1,200	1.83	2.11
			560	762	1.16	1.29
			630	1,140	1.74	2.01
		2,960	790	1,230	1.88	2.10
		2,210	790	1,210	1.85	2.13
		1,930	330	774	1.18	1.36
		3,120	495	894	1.36	1.52
		880	380	512	.782	.90
		790	330	414	.632	.71
December		4,320	330	837	1.28	1.48
The year	r1911	6,180	330	944	1.44	19.56
January	1911	4,500	630	1,160	1.77	2.04
		3,960	710	1,280	1.95	2.03
		3,960	630	1,240	1.89	2.18
		8,460	880	2,420	3.70	4.13
		1	560	853	1.30	1.50
		790	380	471	.719	.80
		1,800	380	568	.867	1.00
		2,350	285	492	.751	.87
		980	330	551	.841	.94
		3,960	380	668	1.02	1.18
		980	380	655	1.00	1.12
		2,800	380	988	1.51	1.74
The year	r	8,460	285	945	1.44	19.53

MONTHLY DISCHARGE OF PIGEON RIVER AT NEWPORT, TENN.—Continued

		Discharges i	n Second-fee	et .	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1912					
January	4,500	560	1,030	1.57	1.81
February	5,420	790	1,340	2.05	2.21
March	13,400	1,420	2,620	4.00	4.61
April	7,700	1,190	2,180	3.33	3.72
May	3,120	710	1,490	2.27	2.62
June	2,070	630	955	1.46	1.63
July	2,500	630	1,310	2.00	2.31
August	2,800	380	691	1.05	1.21
September	1,540	285	469	.716	.80
October	880	330	454	.693	.80
November	1,420	285	392	.598	.67
December	1,420	330	540	.824	.95
The year	13,400	285	1,120	1.71	23.34
January	5,420	710	1,290	1.97	2.27
February.	6,560	880	1,360	2.08	2.17
March	21,400	980	3,580	5.47	6.31
April	3,120	1.080	1,710	2.61	2.91
May	10,200	630	1,620	2,47	2.85
June	3,620	630	1,190	1.82	2.03
July	1,300	430	647	.988	1.14
August	1,150	430	641	.979	1.13
September	900	310	467	.713	.80
October	1,540	285	400	.611	.70
November	560	330	419	.640	.71
December	790	380	500	.763	.88
The year	21,400	285	1,150	1.76	23.90
1914	710			704	0.00
January	710	380	474	.724	0.83 1.53
February	2,960	435	961	1.47	
March	3,120	630	1,090	1.66	1.91
April	3,790	710	1,270	1.94	2.16
May	1,080	435	651	.994	1.13
July	2,210	285	603	.921	.81
	1,190	242	461		.81
August	1,930	242	534	.815	.52
September October	495	242	308	.470	1.35
	9,410	202	767	1.17	1.35
November	7,510 9,030	285 710	692 2,020	1.06 3.08	3.55
The year	9,410	202	819	1.25	16.96
- 110 y Cai	3,410	202	019	1.20	

MONTHLY DISCHARGE OF PIGEON RIVER AT NEWPORT, TENN.—Continued

		t			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1915				•	
January	4,860	790	2.070	3.16	3.64
February	7,320	790	1,860	2.84	2.96
March	1,540	790	907	1.38	1.59
April	1,930	710	909	1.39	1.5
Mav	3,790	790	1,180	1.80	2.08
June	2,210	790	1,090	1.66	1.8
July	2,210	560	987	1.51	1.7
August	1,670	495	725	1.11	. 1.2
September	1,930	380	566	.864	.90
October	4,320	435	832	1.27	1.46
November	1,800	330	575	.878	.98
December	18,000	495	2,220	3.39	3.9
The year	18,000	330	1,160	1.77	24.00
1916	2.700	000	1 700	0.00	0.1
January	3,790	980	1,760	2.69	3.10
February	5,990	790	1,810	2.76	2.98
March	2,210	790 790	1,380	2.11	2.4
April	1,930		1,130	1.73	1.7
May	4,860	560	996	1.52	2.4
June	3,790	710 560	1,420	2.17 3.82	4.4
July	8,460	560	2,500 1,230	1.88	2.1
August	3,620 630	330	400	.611	.6
October	1,420	330	489	.747	.8
	710	330	390	.595	.6
November	3,280	630	880	1.34	1.5
The year	8,460	330	1,200	1.83	24.95
1917	9,000	000	1 500	0.42	2.80
January	3,280	880 880	1,590 2,200	2.43	3.50
February	7,320	2,350		7.69	8.8
March	16,800		5,040	3.31	3.69
April	4,320	1,300	2,170	1.83	2.11
May	1,930	880 790	1,200 1,000	1.53	1.7
June	2,070	630	1,000	1.86	2.14
July	3,620	560	907	1.38	1.59
August	2,500 3,960	435	1,050	1.60	1.78
SeptemberOctober	$\frac{3,960}{2,350}$	435	674	1.00	1.19
	980	560	673	1.03	1.18
November	980	300	611	.933	1.08
The year	16,800	435	1.530	2.33	31.61

Monthly Discharge of Pigeon River at Newport, Tenn.—Continued

		Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1918					
January	11,100		2,700	4.12	4.75
February	4,140	1,080	1,750	2.67	2.78
March	2,500	880	1,160	1.77	2.04
April	2,500	980	1,280	1.95	2.18
May	1,930	880	1,300	1.98	2.28
June	7,130	710	1,680	2.56	2.86
July	2,500	495	999	1.53	1.76
August	2,500	560	963	1.47	1.70
September	1,540	495	720	1.10	1.53
October	12,600	348	1,390	2.12	2.44
November	3,880	695	1,130	1.73	1.93
December	12,200	620	2,060	3.14	3.62
The year	12,600	348	1,430	2.18	29.57
January	10,300	695	2,090	3.19	3.68
February	3,370	695	1,390	2.12	2.21
March	5,020	695	1,580	2.41	2.78
April	2,760	620	1,130	1.72	1.92
May	2,200	780	1,110	1.69	1.95
June	2,480	445	843	1.29	1.44
July	2,760	445	927	1.42	1.64
August	1,680	265	643	.982	1.13
September	1,200	130	313	.478	.53
October	2,070	102	563	.860	.99
November	555	265	366	.559	.62
December	4,620	395	969	1.48	1.71
The year	10,300	102	- 994	1.52	20.60
January	3,880	445	1,230	1.88	2.17
February	6,000	875	1,650	2.52	2.72
March.	8,960	780	2,650	4.05	4.67
April	31,000	1,200	3,600	5.50	6.14
May	2,200	620	1,020	1.56	1.80
June	2,200	445	853	1.30	1.45
July	1,200	498	701	1.07	1.23
August	3,370	555	1,510	2.30	2.65
September	1,810	498	841	1.28	1.43
October	845	355	475	.725	.84
November		410	716	1.09	1.22
December	12,600	605	1,820	2.78	3.20
The year	31,000	355	1,420	2.17	29.52
	·	l 			

MONTHLY DISCHARGE OF PIGEON RIVER AT NEWPORT, TENN.-Continued

	1				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1921				-	
January	4,040	935	1.700	2.60	3.00
February	7,810	1.040	2,600	3.97	4.13
March.	2,000	760	1,070	1.63	1.88
April	6,550	760	1,660	2.53	2.8
May	4,200	1,140	1,620	2.47	2.8
June	1,870	760	1,100	1.68	1.8
July	7,990	535	1,350	2.06	2.38
August	2,970	935	1,380	2.11	2.43
September	1,480	355	717	1.09	1.22
October.	1,250	300	560	.855	.99
November.	2,260	410	958	1.46	1.68
December.	2,260	535	1,030	1.57	1.81
The year	7,990	300	1,310	2.00	27.01
1922					
January	7,990	680	1,870	2.85	3.29
February	8,170	1,140	2,170	3.31	3.48
March.	6,910	1,480	2,700	4.12	4.78
April.	3,720	1,250	2,050	3.13	3.49
May	3,880	1,140	2,040	3.11	3.58
June	2,260	680	1,460	2.23	2.49
July	3,570	845	1,660	2.53	2.92
August	2,130	410	689	1.05	1.21
September	605	300	421	.643	.75
October	430	290	348	.531	.61
November	330	290	298	.455	.51
December	6,550	330	1,260	1.92	2.21
The year	8,170	290	1,410	2.16	29.23
1923 January	4,360	845	1,540	2.35	2.71
February	5,360	1,040	2,500	3.82	3.98
March.	8,350	935	2,810	4.29	4.95
April	4,200	1,040	1,490	2.27	2.53
May.	4,040	1,140	1,930	2.95	3.40
June	2,400	1,040	1,480	2.26	2.52
July	2,000	550	998	1.52	1.75
August	1,610	550	805	1.23	1.42
September	550	430	460	0.702	0.78
October	330	290	324	0.495	0.57
November.	550	330	389	0.594	0.66
December.	1,740	380	788	1.20	- 1.38
The year	8,350	290	1,290	1.97	26.65

LITTLE PIGEON RIVER AT SEVIERVILLE, TENN.

Location. At H. O. Eckel farm house, half a mile below Sevierville, Sevier County, half a mile below confluence of East and West forks, and 5 miles above mouth

Drainage Area. 346 square miles (measured on topographic maps).

Gage. Vertical staff in two sections spiked to trees on left bank, 100 feet from Eckel farm house; read by Harry Eckel.

Discharge Measurements. Made by measuring East and West forks of river

from highway bridges just above confluence and half a mile above gage, or by wading at section 1,000 feet below confluence.

wading at section 1,000 feet below connuence.

Channel straight for a quarter of a mile above gage and 500 feet below. Low water control is rock shoal 500 feet below gage; probably permanent. Medium and high water control is a concrete dam in three sections about 1 mile below gage. Right bank at gage is low and subject to overflow above gage height 6 feet; left bank high and not subject to overflow except during extremely high water. During ordinary floods all water passes under the bridges from which discharge measurements are made, but extreme floods injundate practically the entire town of Sevierwille. During but extreme floods inundate practically the entire town of Sevierville. During extreme floods on French Broad River it is possible that stage-discharge relation may be affected by backwater.

Extremes of Discharge. Maximum stage recorded, 10.25 feet at 5 p.m. February 10, 1921 (discharge, 15,400 second-feet); minimum stage, 0.65 foot October 15, 1922 (discharge, 15 second-feet).

ICE. Stage-discharge relation not affected by ice.

REGULATION. Operation of power plant on West Fork 3 miles above Sevierville causes considerable fluctuation during low water. Several flour mills on

both forks cause some regulation.

Accuracy. Stage-discharge relation practically permanent. Rating curve well defined between 50 and 3,000 second-feet; fairly well defined between 3,000 and 15,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except those for high stages, which are fair.

[MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF LITTLE PIGEON RIVER AT SEVIERVILLE, TENN.

	Year							
Week	1920	1921	1922	1923				
1		439	221	1,1				
2		1,385	357	4				
3		805	3,621	3				
1		600	1,415	1,9				
5		765	454	3,5				
3		3,993	697	2,0				
7		1,108	2,831	2,1				
3		1,306	651	4				
9		609	1,675	3				
0		486	2,487	2,7				
1		384	1,423	2,6				
2		812	603	1,4				
3		823	952	7				
		654	700	6				
5		398	522	5				
3		1,806	1,548	4				
7 		876	1,089	e				
3		971	2,165	(
		896	931	7				
			657					
)		472		1,5				
		1,143	491					
2		801	456	1,0				
		495	904					
1		532	759	(
5		659	536					
6		524	305					
7		312	1,051	4				
8		405	886	2				
9		1,624	1,421					
0		554	685					
1		491	328					
2		539	466					
3		847	327	1 - 1				
4		569	309					
5		456	317					
6		294	157					
7		271	222					
8		195	91					
9		184	81					
0		366	55					
		165	77					
1		127	47					
2		130	66					
3		229	40					
4			71					
5		146	134					
6		309	64					
7		387						
8	367	837	117					
9	557	669	627					
50	1,843	178	3,325					
51	1,077	282	2,406					
52	909	358	423					

Monthly Discharge of Little Pigeon River at Sevierville, Tenn. [Drainage area, 346 square miles]

	1	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1920					
November 23-30	612	207	332	.960	.29
December	8,210	305	1,050	3:03	3.49
1921			-7.4		
January	3,040	355	813	2.35	2.71
February	15,000	550	1,770	5.12	5.33
March.	2,470	282	576	1.66	1.91
April	4,480	320	955	2.76	3.08
May	3,970	355	903	2.61	3.01
June	1,230	310	541	1.56	1.74
July	4,310	242	698	2.02	2.33
August	1,590	256	611	1.77	2.04
September	490	119	242	.699	.78
October	645	75	190	.549	.63
November	1,480	75	369	1.07	1.19
December	1,940	99	409	1.18	1.36
The year	15,000	75	673	1.95	26.11
January	10,200	101	1,310	3.79	4.37
February	11,100	191	1,310	3.38	3.52
March	8,420	355 405	1,510	4.36	5.03
April	3,810	380	987	2.85	3.18
May	4,660	335	968	2.80	3.23
June	1,480	195	623	1.80	2.01
July	3,650	380	954	2.76	3.18
August	855	126	353	1.02	1.18
September	405	50	145	.419	.47
October	195	23	59	.171	.20
November	455	23	74.9	.216	.24
December	18,200	163	1,560	4.51	5.20
The year	18,200	23	810	2.34	31.81
1923		=======================================			
January	5,860	330	1,190	3.44	3.97
February	6,630	155	1,760	5.09	5.30
March.	8,680	395	1,760	5.09	5.87
April	1,120	368	586	1.69	1.89
May	1,920	384	888	2.57	2.96
June	1,690	270	648	1.87	2.09
July	548	119	303	0.876	1.01
August	1,070	187	467	1.35	1.56
September	218	35	103	0.298	0.33

LITTLE TENNESSEE RIVER AT FRANKLIN, N. C.

Location. At steel highway bridge one-fourth mile northeast of Southern Railway Station, one-half mile northeast of court house at Franklin, Macon County, and one mile below mouth of Cullasegee River.

DRAINAGE AREA. 297 square miles (measured on topographic map).
RECORDS AVAILABLE. June 12, 1907 to July 12, 1910; February 9, 1921 to De-

cember 31, 1923.

Gage. Present gage is a standard gage attached to upstream side of highway bridge. Original gage used during 1907-1910, was a staff on right bank 700 feet upstream from bridge but in the same pool. Original datum has been used for present gage but difference in location has some effect on stage-discharge relation. Gage read by H. H. Mashburn.

DISCHARGE MEASUREMENTS. Made from upstream side of bridge to which gage

is attached.

CHANNEL AND CONTROL. Channel above and below gage is slightly curved.

Bed of stream composed of rock, sand and gravel; fairly normal. Both banks are steep but extreme floods will overflow both banks and cultivated flats. Control is formed by a boulder riffle just below bridge and another 300 feet below. The remains of an old fish trap about one-fourth mile below will probably have no effect on stage-discharge relation which is probably per-

EXTREMES OF DISCHARGE. 1907-1910 and 1921-1923: Maximum stage recorded, 10.0 feet June 4, 1909 (discharge, 7,950 second-feet); minimum stage recorded, 1.02 feet at 8:00 a.m. November 18 and 5:10 p.m. November 25, 1922 (dis-

charge 201 second-feet).

ICE. Stage-discharge relation rarely if ever affected by ice.

REGULATION. A few small plants on tributaries may cause slight diurnal fluc-

tuations at low stages.

Accuracy. Stage-discharge relation fairly permanent. Rating curves well defined. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF LITTLE TENNESSEE RIVER AT FRANKLIN, N. C.

				Year			
Week	1907	1908	1909	1910	1921	1922	1923
1		1 404	1 070	025		700	
1		1,494	1,078	935		596	1,10
3		2,386	778	944		975	5
4		1,211	1,014	772		2,136	59
4 5		943	726	762		2,440	1,13
6		1,083	628	646		1,114	98
		1,131	1,239	616	1 000	1,230	1,30
7		2,964	1,811	898	1,636	1,944	1,5
8		1,557	1,974	1,037	1,593	1,241	8
9		1,254	1,441	1,637	1,063	1,579	8
0		1,075	1,708	1,060	891	1,920	8
1		1,057	2,630	844	779	1,899	1,6
2		1,831	1,894	751	829	1,474	1,3
3		1,140	1,951	654	836	2,577	8
4		994	1,219	607	732	1,900	8
5		1,028	1,213	573	698	1,447	1,3
6		1,196	1,053	1,006	1,456	1,476	1,0
7		2,206	1,091	687	1,137	1,166	5
8		1,264	1,797	576	931	1,647	8
9		1,286	1,686	1,914	846	1,324	5
0		977	1,609	946	864	1,166	1,1
1		956	2,981	1,919	1,297	1,313	2,0
2		926	1,706	1,111	755	1,259	2,5
3		879	3,843	981	691	1,156	1,3
4		869	1,749	1,123	597	887	1,(
5		779	1,480	835	497	783	8
6		684	1,459	665	706	639	8
7	- 640	918	1,227	890	474	627	7
8	595	998	1,264		495	584	(
9	527	704	901		663	743	(
0	441	611	868		536	624	
1	388	567	939		594	464	4
2	354	625	1,708		499	448	
3	563	489	1,249		495	427	4
4	488	944	685		450	364	
5	319	854	561		389	321	4
6	316	757	489		318	313	3
7	296	556	517		338	339	;
8	891	412	793		338	278	
9	- 843	374	784		524	297	3
00	464	356	518		419	271	2
1	334	494	648		296	334	2
2	288	362	802		278	278	3
3	297	646	524		257	266	2
4	325	735	467		404	247	3
5	555	517	418		361	239	3
6		546	415		494	238	2
7	665	517	436		703	249	3
8		574	402		734	264	4
9	1,019	1,461	908		754	619	8
0		929	1,995		487	663	6
1	1,571	851	827		823	1,504	7
2	1,293	938	679		906	672	6
	-,-00	000	010		000		

Monthly Discharge of Little Tennessee River at Franklin, N. C. [Drainage area, 297 square miles]

]				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907					
June 12-30	930	570	672	2.26	1.60
July	755	405	544	1.83	2.11
August	755	305	432	1.45	1.67
September	4,650	250	567	1.91	2.13
October	595	285	344	1.16	1.34
November	755	325	599	2.02	2.25
December	1,680	755	1,230	4.14	4.77
1908	=======		2,200	1.11	4.11
January	5,050	870	1,460	4.92	5.67
February	7,650	960	1,700	5.72	6.17
March	3,950	930	1,700	4.28	4.93
April	4,950	755	1,350	4.55	5.08
May	2,070	870	1,080	3.64	4.20
June	1,240	672	823	2.77	3.09
July	1,380	520	792	2.67	3.08
August	1,240	472	694	2.34	2.70
September.	930	345	541	1.82	2.70
•	1,180	345	505	1.70	
October November	755	450	536	1.70	1.96
		570			2.01
December.	3,860	970	1,020	3.43	3.95
The year	7,650	345	981	3.30	44.87
January	1,800	615	877	2.95	3.40
February.	3,140	560	1,520	5.12	5.33
March	4,750	1,120	1,970	6.63	7.64
April	1,560	915	1,150	3.87	4.32
	4,950	980	1,990	6.70	7.72
June	7,950	1,290	2,140	7.21	8.04
	1,640	730	1.060	3.57	4.12
JulyAugust	2,870	560	882	2.97	3.42
	1,720	438	638	2.97	2.40
September	1,720	415	608	2.15	2.40
October	560	415	427	1.44	1.61
December	3,950	325	1,020	3.43	3.95
The year	7,950	325	1,190	4.01	54.31
1910				- 0	
January	2,690	615	834	2.81	3.24
February	2,510	588	841	2.83	2.95
March	2,600	642	997	3.36	3.87
April	2,150	535	712	2.40	2.68
May	3,500	535	1,340	4.51	5.20
June	2,060	630	994	3.35	3.74
July 1-12	1,790	420	905	3.05	1.36

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT FRANKLIN, N. C.—Continued

		Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1921		4.400	4 000		
February 9-28	4,450	1,100	1,880	6.33	4.70
March	1,100	695	850	2.86	3.30
April	2,420	600	1,000	3.37	3.76
May		695	960	3.23	3.72
June	1,480	465	633	2.13	2.38
July	960	420	541	1.82	2.10
August	1,030	375	491	1.65	1.90
September	760	278	378	1.27	1.42
October	542	242	319	1.07	1.23
November	1,030	278	526	1.77	1.98
December	1,720	442	762	2.57	2.96
1922					
January	6,350	570	1,500	5.05	5.82
February	3,950	1,030	1,380	4.65	4.84
March	3,860	1,180	1,940	6.53	7.53
April	2,870	1,100	1,520	5.12	5.71
May.	2,870	1,030	1,340	4.51	5.20
June	1,890	600	932	3.14	3.50
July	960	515	636	2.14	2.47
August	542	315	402	1.35	1.56
September	465	242	307	1.03	1.15
October	490	225	283	0.953	1.10
November	335	210	240	.808	.90
December.	3,860	242	826	2.78	3.20
The year.	6,350	210	942	3.17	42.98
1923					
January	2,330	490	861	2.90	3.34
February		760	1,190	4.01	4.18
March	2,600	728	1,150	3.87	4.46
April		760	1,040	3.50	3.90
May	3,950	792	1,480	4.98	5.74
June	2,330	760	1,160	3.91	4.36
July	960	442	661	2.23	2.57
August	662	375	483	1.63	1.88
September	465	278	347	1.17	1.30
October	600	225	276	.929	1.07
November	792	242	356	1.20	1.34
December	1,560	442	690	2.32	2.68
The year	3,950	225	808	2.72	36.82

LITTLE TENNESSEE RIVER AT ALMOND, N. C.

LOCATION. At old footbridge one-fourth mile above mouth of Nantahala River, half a mile east of railroad station at Almond, Swain County, and 3 miles above Judson.

Drainage Area. 453 square miles (measured by Knoxville Power Co., on topographic maps).

RECORDS AVAILABLE. April 16, 1912 to November 30, 1917, when station was discontinued.

Gage. Vertical staff attached to center pier of footbridge. January 1, 1914, a Friez water-stage recorder was installed half a mile above footbridge. Gages set to independent datums. At times backwater from Nantahala River affected readings on staff at footbridge, but recorder was above backwater effect. An auxiliary staff 1 mile upstream was read when backwater affected readings on lower staff. Gages read by employee of Knoxville Power Co.

DISCHARGE MEASUREMENTS. Made from footbridge to which lower staff was at-

tached.

Channel and Control. Bed composed of rock and boulders. Channel straight below gage but bends sharply 200 feet upstream. Banks not subject to overflow except during extremely high water. Control is series of rock riffles, probably practically permanent.

EXTREMES OF DISCHARGE. Maximum mean daily discharge recorded, 12,700 second-feet, March 4, 1917 (from extension of rating curve); minimum mean daily discharge, 212 second-feet, September 16 and 17, 1914.

ICE. Stage-discharge relation probably seldom affected by ice.

REGULATION. Probably regligible.
COOPERATION. All records furnished by Knoxville Power Co.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF LITTLE TENNESSEE RIVER AT ALMOND, N. C.

			Ye	ar		
Week	1912	1913	1914	1915	1916	1917
		745		1 057	9.057	
		745	649	1,657	2,057	1,2
2		815	515	1,899	1,823	1,2
3		779	451	2,379	1,692	1,6
1		1,425	444	2,442	1,903	1,8
5		1,339	629	2,924	2,979	1,6
3		1,099	929	2,163	2,056	1,2
7		1,133	898	1,780	1,496	1,:
3		1,065	1,046	1,671	1,273	2,
)		1,769	793	1,467	1,542	4,0
)		1,194	734	1,699	1,345	3,8
		4,807	1,146	1,226	1,086	2,5
		2,117	837	1,084	928	2,8
		4,139	906	1,010	1,019	2,8
		1,792	* 884	964	1,108	2,
		1,725	1,241	849	1,096	2,0
	1,439	1,376	1,501	729	909	1,
	1,771	1,079	1,036	691	801	1,
	1,722	926	833	637	695	1,
	1,474	906	701	1,413	596	1,
	1,115	807	539	1,043	591	
	939	1,791	483	784	2,231	
	1,227	1,035	431	875	1,122	
	962	1,060	475	679	1,459	
	984	802	460	749	1,292	
	781	718	482	602	1,101	
	1,454	645	375	1,273	1,019	
	1,420	581	416	1,431	851	
	1,415	569	504	997	5,829	
	1,409	463	411	725	4,306	- 1
	1,010	577	357	553	2,747	
	983	726	334	517	1,867	
	784	746	498	424	1,479	1,
	706	501	402	448	1,201	
	656	450	339	572	969	
	583	423	346	422	803	1,
	465	441	282	682	680	,
	625	389	252	514	718	
		534	308	464	559	
	588	421	245			
	832			399	654	
	531	397	388	1,810	509	
	433	347	-297	757	472	
	568	439	1,944	1,253	650	
	461	683	494	1,007	539	
	466	459	392	649	661	
	633	439	413	549	470	
	493	405	715	672	532	
	420	382	509	1,413	619	
3	420	473	1,981	902	679	
)	968	596	3,136	678	653	
)	574	468	1,154	733	723	
	476	409	1,009	3,472	734	
2	780	809	3,404	3,166	. 1,186	
	,		-,	-,-00	-,100	

Monthly Discharge of Little Tennessee River Near Almond, N. C. (Drainage area, 453 square miles)

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1912	-				
April 16-30	2,025	1,261	1,616	3.57	1.99
May	1,940	880	1,311	2.89	3.33
June	2,122	670	1,040	2.29	2.56
July	1,989	770	1,271	2.80	3.23
August	1,454	540	747	1.65	1.90
September	1,366	402	625	1.38	1.54
October	980	392	489	1.08	1.24
November	930	392	497	1.10	1.23
December	1,767	431	662	1.46	1.68
1913					
January	2,281	654	984	2.17	2.50
February	3,076	851	1,232	2.72	2.83
March	9,170	970	2,876	6.34	7.31
April	2,307	1,010	1,504	3.32	3.70
May	3,971	716	1,115	2.46	2.84
June	1,231	564	819	1.81	2.02
July	841	412	562	1.24	1.43
August	1,170	372	574	1.27	1.46
September	_ 689	353	441	0.973	1.09
October	1,150	333	470	1.04	1.20
November	572	359	404	0.891	0.99
December	1,160	392	589	1.30	1.50
The year	9,170	333	964	2.13	28.87
1914	1	401	F04	1 17	1.05
January		401	531	1.17	1.35 2.14
February		639	935 892	2.06 1.95	2.14
March		680			2.83
April		732	1,153	2.54 1.33	1.53
May	1,030	419	605 450	0.993	1.11
June	744	318 272	413	0.995	1.11
July	1,030		394	0.911	1.00
August	841	272	272	0.809	0.67
September	378		744	1.64	1.89
October	5,625	248	691	1.52	1.70
November	5,625	378	2,162	4.77	5.50
December	5,671	868	2,102	4.11	0.00
The year	5,671	212	770	1.70	23.02

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT ALMOND, N. C.—Continued

		Discharges in	Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1915	-2				
January	3,686	1,264	2,059	4.54	5.23
February	5,625	1,398	2,123	4.68	4.8
March	2,235	964	1,274	2.81	3.2
April	1,060	654	813	1.79	2.0
May	2,042	574	950	2.10	2.43
June	2,844	480	812	1.79	2.00
July	1,874	458	927	2.05	2.30
August	868	413	483	1.07	1.2
September	1,288	368	507	1.12	1.2
October	3,218	622	1, 158	2.55	2.9
November	2,776	532	854	1.88	2.10
December	9,621	602	1,970	4.35	5.05
The year	9,621	368	1,161	2.56	34.66
1916	0.040		1 940	4.06	4 .68
January	2,646	1,515	1,840		4.0
February	5,490	1,132	1,881	4.15	2.9
March	1,723	868	1,157	2.55	2.3
April	1,385	736	969	2.14	2.3
May	4,890	540	1,066		
June	2,535	844	1,157	2.55	2.8
July	10,100	676	3,252	7:17	8.2
August	2,190	772	1,256	2.77	3.19
September	1,424	480	661	1.46	1.63
October	1,108	448	567	1.25	1.4
November	1,108 2,090	458 556	566 828	1.25 1.83	1.40 2.11
			1 007	0.70	38.0
The year	10,100	448	1,267	2.79	38.0
January	2,662	574	1,475	3.25	3.78
February	4,890	976	1,797	3.96	4.12
March	12,700	1,916	3,468	7.65	8.82
April	3,648	1,288	1,892	4.17	4.65
May	1,528	784	1,044	2.30	2.66
June					
July	1,902	468	708	1.56	1.80
August	1,580	408	650	1.43	1.65
September	2,678	438	798	1.76	1.96
October	1,888	453	645	1.42	1.64
November	676	443	519	1.14	1.27

LITTLE TENNESSEE RIVER AT JUDSON, N. C.

LOCATION. One-fourth mile downstream from concrete highway bridge which is at Judson railway station, Swain County, half a mile below mouth of Yalaka Creek, 1 mile upstream from old U.S. Geological Survey gaging station site at Southern

Railway bridge and 3 miles below mouth of Nantahala River at Almond, N. C. Drainage Area. 668 square miles (measured by Knoxville Power Company on

topographic maps), 670 square miles at former location.

RECORDS AVAILABLE. June 25, 1896 to September 13, 1913, at former station, and April 16, 1912 to December 31, 1923.

GAGE. Present gage is a vertical staff attached to big sycamore tree on right bank, read by an employee of Knoxville Power Company. Prior to October 26, 1918, the gage was a Friez automatic recorder located at site of present rod. Recorder was washed away by flood October 26, 1918. Datum of present rod. Reprobably somewhat different from that of Friez recorder, due to settlement. Elevation of zero of Friez gage was 1,400 feet above mean sea level. Datum of Friez gage and of new gage not related to old U. S. Geological Survey gage, which was a chain gage on bridge until 1905, when a staff gage was installed on right bank 100 for above bridge. on right bank 100 feet above bridge.

DISCHARGE MEASUREMENTS. Made from concrete highway bridge one-fourth

mile above gage, since 1920.

Channel straight for several hundred feet above and below bridge. Bed of stream at bridge consists of gravel and boulders and is rough; at gage, sand, probably shifting. Both banks sloping but high and subject to overflow only during extremely high stages. Control formed by a

riffle one-fourth mile below gage; probably permanent.

Extremes of Discharge. 1896-1923: Maximum stage recorded, (old Geological Survey Station), 16.19 feet February 28, 1902 (discharge 43,300 second-feet); minimum stage recorded (old Geological Survey station), 2.1 feet October 13 to

November 1, and December 20, 1904 (discharge, 275 second-feet).

ICE. Stage-discharge relation seldom if ever affected by ice.

REGULATION. Very slight diurnal fluctuations during low stages from small plants

on tributaries.

Accuracy. Stage-discharge relation fairly permanent. Rating curves well developed below 3,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION. Gage-height record furnished by Knoxville Power Company since April 16, 1912.

Breaks in the record have been filled in by estimates derived from comparative mean daily discharge hydrographs.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET

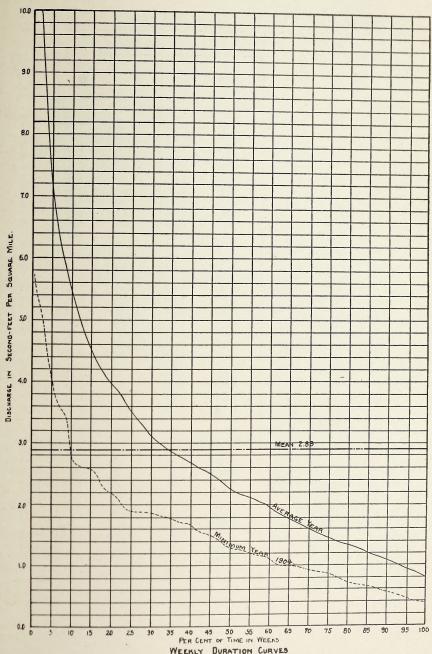
						Y	ear						
Week	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908
1		1,663	806	1,851	409	1,776	6,709	2,023	520	1,141	3,281	2,887	3,08
2		1,850	779	2,217	1,014	5,106	3,166	1,924	584	4,368	2,586	2,319	3,91
3		2,439	1,235	1,900	868	1,349	2,660	1,576	1,039	1,676	2,317	1,903	2,77
4		2,770	3,180	1,806	806	1,550	2,917	1,653	1,747	1,016	5,056	1,643	2,00
5		4,194	1,148	5,583	712	1,981	5,097	2,433	655	953	2,719	1,993	2,2
66		3,886	585	17,411	1,639	1,916	3,474	4,374	1,200	3,977	2,033	2,617	2,3
7		3,789	746	2,604	5,961	1,454	2,680	4,926	1,263	2,827	1,730	1,716	5,8
3		5,971	1,081	1,911	1,753	1,383	2.459	3,559	2,820	4,601	1,624	1,550	3,0
9		2,507	827	614	3,026	1,249	10,864	11,183	1,249	2,226	1,684	2,720	2,5
0		6,134	694	1,837	3,239	2,634	3,521	7,993	3,704	1,913	1,969	2,497	2,2
1		10,821	845	9,291	2,897	1,940	3,314	6,320	2,313	1,999	2,466	2,137	2,5
2		13,087	960	13,529	2,289	2,056	2,314	9,580	3,324	2,186	3,231	1,640	4,1
3		6,476	6,501	4,699	2,049	7,741	6,303	7,129	1,694	1,520	2,980	1,546	3,0
1		9,890	3,441	2,271	1,409	5,824	2,971	11,527	1,743	1,381	2,573	1,580	2,1
5		4,201	1,547	1,777	2,790	2,767	3,657	6,304	1,800	1,880	2,690	1,564	1,9
3		2,246	1,879	1,640	1,846	5,803	3,474	3,803	1,474	1,459	2,757	1,670	2,4
7		1,489	1,623	1,946	1,444	2,660	1,910	3,037	1,260	1,381	2,064	2,886	4,0
3		1,944	1,716	2,960	906	1,549	1,757	2,386	1,243	2,213	2,097	1,990	2,5
9		1,780	2,089	2,317	686	1,373	1,279	1,957	2,429	2,010	1,489	2,209	2,1
)		3,527	1,764	1,947	713	5,524	1,644	1,824	1,220	2,167	1,373	1,920	2,0
l		1,904	651	755	1,374	5,313	1,417	1,531	992	1,973	1,450	1,657	2,1
2		2,010	415	437	1,621	2,889	1,293	2,613	1,143	1,886	1,883	2,134	1,8
3		2,261	430	401	1,931	1,840	1,149	3,663	1,036	1,244	1,517	1,970	1,3
4		1,740	491	4,804	2,263	3,907	1,147	2,716	800	1,123	2,553	1,667	1,7
5		1,624	706	956	3,770	3,521	1,070	1,616	842	1,399	2,357	1,591	1,2
6		1,520	766	1,181	4,194	1,679	1,053	1,754	873	1,061	1,973	1,836	9
7	2,508	1,726	304	1,756	3,376	2,391	862	1,410	636	979	2,039	1,317	1,9
3	7,474	1,729	2,113	884	2,593	1,780	1,140	1,667	783	3,044	2,766	1,380	1,7
9	2,129	3,287	1,123	1,273	1,476	1,347	837	1,276	666	1,753	4,483	1,229	1,2
)	2,759	2,076	1,371	2,411	2,046	1,487	674	926	661	1,444	2,534	976	1,1
	1,429	1,659	5,276	1,926	1,774	1,481	686	1,504	715	1,210	2,843	950	9
2	1,194	1,530	7,016	2,007	1,310	4,590	571	855	1,499	2,020	2,529	802	1,3
3	1,490	1,883	8,057	890	1,193	10,280	584	1,170	950	1,611	2,827	1,147	8
1	1,165	1,507	3,519	496	1,326	7,551	521	681	769	1,370	2,653	944	2,0
5	767	943	4,643	1,099	1,257	6,751	597	625	1,143	1,171	3,539	571	1,2
	774	841	11,526	1,294	1,147	1,754	651	540	855	825	2,404	777	1,1
Z	675	861	1,921	365	1,181	1,416	719	708	571	653	1,930	635	8
)	779	628	1,576	340	1,240	1,283	861	540	449	680	3,816	1,384	7
	745	557	1,586	469	1,249	1,266	1,524	435	403	539	5,214	1,607	6
)	728	584	13,136	488	1,240	1,211	876	397	324	755	7,764	1,116	5
2	702	1,380	4,456	2,164	1,591	1,890	921 779	433	301 265	1,102	3,793	746 680	. 5
3	609	883	3,454	551	1,720	1,274		499		693	2,984		
1	823 993	644 666	2,696 3,386	584 546	3,271	1,197 1,099	661 635	407 497	265 374	834 577	2,353 1,919	661 863	1,7 $1,2$
± 5	2,459	760	3,380	712	1,319 976	983	1,346	615	357	539	1,699	990	1,0
ô 	2,459 4,293	700	2,289	648	834	983 917	759	786	480	478	1,099		1,1
7	1,621	693	2,289	648	1,011	889	917	656	433	624	6,231	2,356	8
8	873	825	2,210	1,051	1,904	847	1,587	438	624	655	2,387	1,690	1,0
)	3,151	1,960	2,191	648	3,249	786	1,853	406	1,170	3,346	2,047	1,384	3,3
0	3,039	1,900	1,890	4,256	1,244	9,110	1,303	495	596	2,571	2,047	2,444	2,4
1	2,270	1,864	1,751	955	2,624	3,403	2,597	642	452	1,914	2,780	2,193	2,2
2	1,744	1,203	2,031	531	1,845	12,830	1,811	639	1,397	2,180	2,665	3,088	2,0
	1,171	1,400	2,001	100	1,010	14,000	1,011	000	1,001	2,100	2,000	0,000	2,0

OF LITTLE TENNESSEE RIVER AT JUDSON, N. C.

							Year								k
1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	Week
2,283	2,103	3,467	2,691	1,201	1,109	2,535	2,905	2,539	810	4,611	996	1,751	1,479	2,463	1
1,736	2,709	2,114	2,136	1,516	951	2,685	2,746	1,956	1,654	2,300	1,374	2,564	2,220	1,397	2
3,156	1,744	1,639	1,694	1,359	837	2,352	2,601	2,667	1,412	2,207	1,597	2,687	5,173	1,464	3
1,857	1,394	1,243	1,436	2,400	793	3,558	2,948	2,557	3,253	2,937	4,084	1,800	5,630	2,839	4
1,457	1,457	1,373	3,696	2,296	1,284	4,443	5,007	2,284	5,298	2,189	2,876	1,786	2,399	2,640	5
2,749	1,457	2,424	1,824	1,841	1,504	3,083	2,960	1,956	2,083	1,757	2,680	4,589	2,641	3,966	6
3,630	1,816	2,131	2,273	2,149	1,509	2,579	2,155	1,859	2,653	2,157	1,803	3,417	4,111	3,113	8
4,697	2,454	1,761	3,966	1,694	1,779	2,380	1,792	4,742	2,645	3,244	1,721	3,179	2,707	1,827	
3,241 3,984	3,423 $2,370$	1,763 1,997	4,111	3,187 2,014	1,371 1,204	2,044 2,444	1,983 2,011	8,316 6,126	1,715 1,566	2,486 4,000	1,425 $2,020$	2,136 1,764	3,536 4,364	1,993 2,183	
6,084	1,953	1,626	3,071 5,407	7,144	2,047	1,710	1,549	3,252	1,382	2,797	2,969	1,704	4,497	3,886	
3,501	1,501	1,410	4,064	3,063	1,380	1,515	1,355	5,192	1,519	2,241	3,060	1,603	3,403	3,083	
4,353	1,347	2,469	5,797	6,621	1,243	1,510	1,475	5,854	1,239	2,459	4,226	1,657	4,887	2,064	
2,709	1,200	7,156	3,877	2,577	1,523	1,402	1,547	4,043	1,431	1,743	8,624	1,457	3,803	1,874	
2,717	1,157	5,956	2,713	2,541	1,936	1,312	1,578	2,902	1,879	1,993	3,661	1,350	2,837	2,871	15
2,376	2,391	4,596	2,419	2,041	2,494	1,098	1,316	2,160	1,501	2,493	2,741	2,577	3,343	2,320	
2,409	1,379	3,497	3,203	1,613	1,719	1,063	1,202	1,815	1,424	1,643	2,879	2,227	2,624	2,079	
3,613	1,186	2,859	2,773	1,326	1,414	974	1,037	1,720	1,417	1,744	2,291	1,743	3,379	1,880	
2,741	3,231	2,066	2,284	1,267	1,191	2,082	909	1,449	1,433	1,899	2,021	1,800	2,956	1,881	
2,330	2,311	1,871	1,771	1,221	989	1,482	896	1,205	1,391	1,543	1,809	1,781	2,307	2,763	
5,970	3,636	1,794	1,447	2,970	819	1,174	3,583	1,231	1,468	1,414	1,664	2,331	2,650	3,511	21
3,181	2,930	1,046	1,956	1,573	723	1,264	1,629	1,273	1,166	1,233	1,421	1,473	2,226	4,376	
7,870	2,754	1,257	1,471	1,629	855	1,017	1,801	1,455	1,198	992	1,057	1,333	2,396	2,631 2,784	
3,211	2,426	1,129	1,477	1,249	717	1,129	2,175	1,328	962	1,025	1,080	1,203	1,940 1,679	1,910	
2,477	2,066	1,029	1,194	1,040	765 546	915	1,677 1,440	1,218 1,037	1,101 1,453	2,139	1,217	1,433	1,436	1,984	26
2,971 2,809	1,747	1,499 895	1,930 1,981	869 974	638	1,599 1,957	1,329	874	858	1,289	1,224	1,016	1,436	1,621	
3,071	2,673 2,749	1,266	2,114	877	672	1,405	8,337	742	672	1,133	1,092	1,146	1,307	1,340	
2,204	1,909	1,133	2,024	679	774	1,057	5,781	1,206	770	1,252	1,750	1,571	1,564		
1,701	1,564	961	1,439	942	548	846	3,989	1,103	937	1,157	1,079	1,119	1,436		30
1,960	1,823	1,568	1,491	1,073	514	830	2,653	1,034	843	912	884	1,189	1,079	1,010	
2,017	2,561	1,100	1,164	1,429	717	680	2,358	949	747	991	2,016	1,026	1,042		
2,244	1,777	745	1,116	961	637	724	1,780	766	832	867	4,334	1,182	932	1,152	
-1,580	1,071	493	988	963	560	937	1,363	671	691	771	2,784	1,076	787	1,131	
1,144	1,386	673	827	746	573	698	1,094	1,331	646	779	1,999	950	673		35
1,000	1,146	801	721	740	430	955	997	1,090	914	649	1,586		638 773		37
1,211	936	576	907	599	403	775	1,003	763	679	596	1,664 1,223	809 1,127	692		38
1,564	842	431	1,230	861	480	752	852	778 1,297	796 761	531 483	1,223		732	1,063	
2,057	943	856	1,182	607	427	637	901 757	829	589	585	929	,	594		40
923	856	524	819	575	593 449	1,148	707	728	542	599	798		685	447	
1,211	1,274 836	850 2,224	901 867	478 649	2,534	1,148	992	1,093	575	677	704		501	495	
1,411		906		1,011	817	1,432	705	806	1,523	1,136	843	906	588	482	
910		696		705	629	974	926	883	4,771	680	861	795	440		44
856		1,280			672	864	732	757	1,236	652	760		394		
829				727	1,041	1,133	853	753	1,083	1,056	1,347	1,473	395		46
855		1,267	659		797	2,147	942	666	1,121	652	956		389		47
751	750				2,695	1,358	1,009	665	1,341	1,141	1,149		464		48
725		1			4,973	988	1,035	638	1,040	1,729	1,408		1,617	1,474	
2,792		931	898			1,028	1,123	646	1,744	3,790			2,007 4,164		
2,784	1	1		683		4,550	1,109	839	5,854	1,571	2,301	873 2,059	1,370		
1,188	884	3,436	1,168	1,287	5,171	4,338	1,816	711	3,521	1,159	2.110	2,009	,,,,,,	1,000	1

Monthly Discharge of Little Tennessee River at Judson, N. C. [Drainage area, 670 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1896					
July	17,400	725	3,490	5.21	6.0
August	2,240	725	1,220	1.82	2.1
September	1,360	545	736	1.10	1.2
October	1,130	590	746	1.11	1.2
November	12,700	820	2,600	3.88	4.3
December 1897	12,700	1,560	3,030	4.52	5.2
1897 January	3,940	1,490	2,150	3.21	3.7
February	16,000	1,620	4,610	6.88	7.1
March	18,100	1,690	8,250	12.3	14.1
April	13,400	1,190	4,500	6.72	7.5
May	4,920	1,240	2,240	3.34	3.8
June	3,940	1,490	1,830	2.73	3.0
July	4,920	1,360	2,160	3.22	3.7
August	2,410	772	1,520	2.27	2.6
September	915	404	731	1.09	1.2
October	3,500	404	829	1.24	1.4
November	1,360 3,500	444 590	775 1,440	1.16 2.15	$\frac{1.2}{2.4}$
December	3,300	390	1,440	2.10	2.4
The year	18,100	404	2,586	3.86	52.1
January	5,980	725	1,510	2.25	2.5
February	1,360	380	807	1.20	1.2
March	14,900	380	1,930	2.88	3.3
April	6,530	1,020	2,250	3.36	3.7
May	2,750	360 315	1,410	2.10	2.4
June July	9,640	280	580 1,220	.866 1.82	2.1
August	22,400	1,430	5,830	8.70	10.0
September	27,800	1,490	4,410	6.58	7.3
October	33,600	1,560	5,690	8.49	9.7
November	3,500	2,070	2,590	3.87	4.3
December	4,420	1,620	1,960	2.93	3.3
The year	33,600	280	2,516	3.76	51.2
1899 January	2,750	1,620	1,920	2.87	3.3
February	26,000	1,690	7,860	11.7	12.1
March	31,800	1,760	6,870	10.3	11.8
April	3,940	1,560	1,980	2.96	3.3
May	6,260	380	1,790	2.67	3.0
June	9,310	360	1,720	2.57	2.8
July	3,110	725	1,600	2.39	2.7
August	4,420	341	1,130	1.69	1.9
September	2,930	315	765	1.14	1.2
October	5,980	452	914	1.36	1.5
November	1,620	460	733	1.09	1.2
December	15,200	452	1,490	2.22	2.5
The year	31,800	315	2,398	3.58	48.4



WEEKLY DURATION CURVES
FOR
LITTLE TENNESSEE RIVER AT JUDSON, N.C.
1897-1923

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT JUDSON, N. C.—Continued

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1900					
January	3,110	380	769	1.15	1.33
February	26,000	680	2,660	3.97	4.1
March.	8,340	1,910	2,790	4.16	4.8
April	6,810	772	1,860	2.78	3.1
May	1,620	590	975	1.46	1.6
June	5,440	1,490	2,900	4.33	4.8
July	3,720	1,490	2,490	3.72	4.2
August	1,910	1,130	1,340	2.00	2.3
September	1,300	1,130	1,210	1.81	2.0
October	9,310	1,240	1,900	2.84	3.2
November	3,940	820	1,180	1.76	1.9
December	7,400	1,130	2,170	3.24	3.7
The year	26,000	380	1,854	2.77	37.4
1901 January	15,200	1,240	2,390	3.57	4.1
February	2,930	1,240	1,620	2.42	2.5
March	22,800	1,190	3,310	4.94	5.7
April	15,600	1,690	4,130	6.16	6.8
May	29,300	1,240	3,450	5.15	5.9
June	8,340	1,430	2,770	4.13	4.6
July	3,500	1,130	1,740	2.60	3.0
August	22,100	1,130	6,620	9.88	11.3
September	3,110	1,240	1,540	2.30	2.5
October	3,300	1,130	1,370	2.04	2.3
November	1,130	820	937	1.40	1.5
December	35,000	772	6,370	9.51	10.9
The year	35,000	772	3,021	4 .51	61.5
January	15,200	1,690	3,890	5.81	6.7
February.	43,300	2,240	4,800	7.16	7.4
March.	18,500	1,690	4,160	6.21	7.1
April	4,920	1,020	2,980	4.45	4.9
May	3,500	915	1,500	2.24	2.5
June	1,490	915	1,140	1.70	1.9
	1,490	635	867	1.70	1.4
July	725	460	592	.884	1.4
August	2,580	460	909	1.36	1.5
September	1,490	635	792	1.30	1.3
October		545		1.18	1.7
November	3,720	1,130	1,070 1,860	2.78	3.2
December	4,180	1,130	1,000	2.18	3.2
The year	43,300	460	2,047	3.06	41.1

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT JUDSON, N. C.—Continued

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1903					
January	3,110	1,360	1,790	2.67	3.08
February	23,200	1,690	4,980	7.43	7.74
March	22,100	3,500	7,980	11.9	13.72
April	16,300	2,410	6,190	9.24	10.31
May	2,750	1,240	1,910	2.85	3.29
June	6,260	1,240	2,580	3.85	4.30
July	2,070	820	1,300	1.94	2.24
August	3,110	545	974	1.45	1.67
September	1,760	404	571	.852	.95
October	725	380	433	.646	.74
November	1,430	334	629	.939	1.05
December	1,080	328	540	.806	.93
The year	23,200	328	2,490	3.72	50.02
1904		_ ====			
January	5,180	452	944	1.41	1.65
February	5,440	412	1,550	2.31	2.49
March	7,710	1,020	2,580	3.85	4.4
April	2,410	1,190	1,560	2.33	2.60
May	6,000	868	1,430	2.13	2.46
June	1,360	680	924	1.38	1.5
July	1,300	502	680	1.01	1.16
August	3,110	590	1,040	1.55	1.79
September	1,240	380	603	.900	1.00
October	380	265	286	.427	.49
November December	820 3,720	265 265	445 917	.664	.74 1.58
		265	1 000		01.00
The year	7,710	205	1,080	1.61	21.9
January	14,500	725	1,940	2.90	3.34
February	13,800	772	3,260	4.87	5.07
March	3,110	1,360	1,930	2.88	3 .32
April	3,500	1,130	1,590	2.37	2.6
May	3,940	1,430	2,060	3.07	3.54
June	2,070	772	1,230	1.84	2.0
July	7,370	770	1,790	2.67	3.08
August	4,980	635	1,490	2.22	2.56
September	1,200	348	685	1.02	1.14
October	1,840	545	823	1.23	1.45
November	1,000	460	568	.848	.98
December	8,030	590	2,370	3.54	4.08
The year	14,500	348	1,645	2.46	33.19

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT JUDSON, N. C.—Continued

	Discharges in Second-feet				-
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1906		-			
January	9,730	1,300	3,290	4.91	5.6
February	2,670	1,520	1,870	2.79	2.9
March.	4,830	1,620	2,520	3.76	4.3
April	3,490	1,840	2,530	3.78	4.2
May	2,930	1,100	1,570	2.34	2.7
June	4,080	1,200	2,150	3.21	3.5
July	6,090	1,300	2,890	4.31	4.9
August	5,130	2,060	2,850	4.25	4.9
September	14,800	1,200	3,360	5.01	5.5
October	10,400	1,950	4,010	5.99	6.9
November	17,400	1,520	2,960	4.42	4.9
December	4,830	1,840	2,420	3.61	4.1
The year	17,400	1,100	2,702	4.03	54.8
1907 January	3,780	1,000	2,100	3.13	3.6
February	3,350	1,520	2,030	3.03	3.1
March	4,830	1,410	2,150	3.21	3.7
April	4,080	1,200	1,920	2.87	3.2
May	3,350	1,200	1,900	2.84	3.2
June	3,210	1,520	1,880	2.81	3.:
July	1,950	910	1,220	1.82	2.
August	1,520	545	890	1.33	1.
September	6,410	460	1,060	1.58	1.
October	1,300	545	815	1.22	1.
November	4,530	815	1,480	2.21	2
December	5,610	1,060	2,240	3.34	3.
The year	6,410	460	1,640	2.45	33.
January	8,880	1,950	2,870	4.28	4.
February	13,000	2,060	3,380	5.04	5.4
March	7,210	1,950	2,980	4.45	5
April	6,410	1,620	2,660	3.97	4.4
May	3,070	1,620	2,180	3.25	3.
June	2,930	910	1,380	2.06	2.3
July	2,930	910	1,440	2.15	2.4
August	3,930	815	1,340	2.00	2.3
September	2,060	545	851	1.27	1.4
October	3,630	460	978	1.46	1.6
November	1,840	725	975	1.46	1.6
December	8,710	1,000	2,460	3.67	4.2
The year	13,000	460	1,958	2.92	39.7
					

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT JUDSON, N. C.—Continued

Month	Discharges in Second-feet				
	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1909					
January	5,610	1,000	2,190	3.27	3.7
February	7,050	1,300	3,360	5.01	5.22
March	10,600	2,670	4,320	6.45	7.44
April	3,490	2,060	2,580	3.85	4.30
May	7,690	2,060	3,610	5.39	6.21
June	11,100	2,060	4,110	6.13	6.84
July	4,230	1,520	2,400	3.58	4.13
August	3,630	1,100	1,860	2.78	3.20
September	3,630	1,000	1,430	2.13	2,38
October	1,520	910	1,130	1.69	1.95
November	1,000	725	841	1.26	1.41
December.	4,980	725	1,780	2.66	3.07
The year	11,100	725	2,468	3.68	49.92
1910					
January	5,930	1,300	1,940	2.90	3.34
February	4,680	1,200	1,860	2.78	2.90
March	5,930	1,300	2,150	3.21	3.70
April	4,830	1,100	1,520	2.27	2.53
May	5,610	1,100	2,730	4.07	4.69
June	3,630	1,520	2,280	3.40	3.79
July	3,210	1,410	2,160	3.22	3.71
August	2,670	1,000	1,740	2.60	3.00
September	2,060	725	1,010	1.51	1.68
October	1,840	635	885	1.32	1.55
November	1,840	502	609	.909	1.0
December	5,610	315	964	1.44	1.6
The year	5,930	315	1,654	2 .47	33 .58
1911 January	7,860	1,100	2,020	3.01	3.47
February	3,350	1,100	2,010	3.00	3.12
March	3,350	1,300	1,830	2.73	3.13
April	11,600	2,300	5,130	7.66	8.58
May	3,070	1,000	1,980	2.96	3.41
June	1,950	910	1,220	1.82	2.03
July	1,840	815	1,050	1.57	1.81
August	3,930	354	921	1.37	1.58
September	1,730	396	678	1.01	1.13
October	5,580	450	1,090	1.63	1.88
November.	2,150	640	1,190	1.78	1.99
December	5,240	825	1,830	2.73	3.15
The year	11, 000	354	1,746	2.61	35.27

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT JUDSON, N. C.—Continued

	Discharges in Second-feet				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1912					
January	6,620	1,320	2,320	3.46	3.99
February	7,680	1,590	2,990	4.46	4.81
March	14,000	2,580	4,350	6.49	7.48
April	5,920	2,030	3,170	4.73	5.28
May	3,060	1,350	2,050	3.06	3.53
June	2,870	1,080	1,510	2.25	2.51
July	2,800	1,140	1,830	2.73	3.15
August	2,720	782	1,140	1.70	1.96
September	3,860	667	991	1.48	1.65
October	1,250	611	808	1.21	1.40
November	1,410	556	744	1.11	1.24
December	2,690	611	1,070	1.60	1.84
The year	14,000	556	1,914	2.86	38.84
1913	3,960	1,090	1,690	2.52	2.90
January	5,880	1,480	2,180	3.25	3.38
March	14,300	1,590	4,450	6.64	7.66
April	3,960	1,440	2,290	3.42	3.82
May	7,470	1,160	1,710	2.55	2.94
June	2,270	862	1,230	1.84	2.05
July-	1,350	647	872	1.30	1.50
August	1,000	011	870	1.30	1.50
September	1,160	495	706	1.05	1.17
October	1,870	460	683	1.02	1.18
November	952	600	696	1.04	1.16
December	1,810	630	959	1.44	1.66
The year			1,528	2.28	30.92
1914	2.060	706	946	1.42	1.64
JanuaryFebruary	2,060 2,170	1,010	1,550	2.32	2.42
March	3,400	1,100	1,510	2.32	2.42
April	3,640	1,290	1,900	2.84	3.17
May	1,780	730	1,040	1.56	1.80
June	1,120	468	728	1.09	1.22
July	1,190	390	642	.961	1.11
August	991	459	615	.901	1.06
September		380	436	.653	.73
October	5,680	380	1,060	1.59	1.83
November	7,780	571	1,040	1.56	1.74
December	9,690	1,340	3,450	5.16	5.95
December					
The year	9,690	380	1,243	1.86	25.28

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT JUDSON, N. C.—Continued

	Discharges in Second-feet				1
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1915					
January	5,260	1,910	2,980	4.46	F 14
February	8,200	2,000	3,090	4.40	5.14 4.82
March	3,100	1,420	1,810	2.71	
April	1,580	1,010	1,220	1.83	3.12
May	3,050	903	1,400		2.04
June		770		2.10	2.42
July	2,830	735	1,160	1.74	1.94
August			1,310	1.96	2.26
September	1,210 1,690	634 583	786	1.18	1.36
October			769	1.15	1.28
November	4,420	978	1,621	2.43	2.80
	3,630	819	1,338	2.00	2.23
December	11,734	889	2,674	4.00	4.61
The year	11,734	583	1,680	2.51	34.02
1916	0 500	2.250	0.740		
January	3,580	2,270	2,750	4.12	4.75
February	8,870	1,600	2,860	4.28	4.62
March	2,680	1,280	1,710	2.56	2.95
April	1,920	1,080	1,390	2.08	2.32
May	7,810	840	1,650	2.47	2.85
June	3,170	1,330	1,750	2.62	2.92
July	15,000	1,050	4,600	6.89	7.94
August	2,970	1,040	1,850	2.77	3.19
September	1,760	700	947	1.42	1.58
October	1,540	634	819	1.23	1.42
November	1,460	700	864	1.29	1.44
December	3,820	1,490	2,420	3.62	4.17
The year	15,000	2,270	1,968	2.95	40.15
January	3,823	1,487	2,417	3.62	4.17
February	7,776	1,440	2,763	4.44	4.31
March	30,000	2,856	6,105	9.14	10.54
April	5,862	1,697	2,726	4.08	4.56
May	1,976	1,064	1,359	2.04	2.34
June	2,537	903	1,288	1.93	2.15
July	2,460	714	974	1.46	1.68
August	1,792	602	852	1.28	1.48
September	3,142	634	1,085	1.63	1.81
October	2,152	627	875	1.31	1.51
November	840	621	726	1.09	1.22
December	880	545	707	1.06	1.22
The year	30,000	545	1,823	2.73	36.99

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT JUDSON, N. C.—Continued

		Discharges in Second-feet			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1918					
January	11,500	721	2,408	3.61	4.10
February	4,226	1,749	2,490	3.73	3.8
March.	1,802	1,171	1,452	2.17	2.50
April	2,790	1,072	1,546	2.32	2.5
May	1,697	1,043	1,391	2.08	2.4
June	1,943	854	1,171	1.75	1.9
July	1.345	647	838	1.26	1.4
August	1,088	559	745	1.12	1.2
September	1,240	535	777	1.16	1.2
October	1,210	501	1,500	2.25	2.5
November		001	1,350	2.02	2.2
December	19,600		2,940	4.40	5.0
The year	19,600	501	1,551	2.32	31.4
1919 January	7,310	1,850	2,950	4,42	5.1
	4,570	1,600		3.53	3.6
February	4,730	1,850	2,360 2,840	4.25	4.9
				2.93	3.2
April	3,350	1,500	1,960	2.93	2.7
May	2,530	1,300	1,610		2.1
June	3,070	864	1,300	1.95	2.0
July	1,650	846 648	1,200	1.80 1.31	1.5
August	2,290	445	873	.862	1.6
September		445	576		1.2
October		591	741	1.11 1.25	1.4
November		738	834 1,970	2.95	3.4
The year	8,310	445	1,601	2.40	32.5
1920 January	5,420	909	2,140	3.20	3.6
February		1,450	2,140	3.20	3.3
March		1,300	2,790	4.18	4.8
April		2,410	4,430	6.63	7.4
May		1,350	1,870	2.80	3.2
June	2,410	990	1,390	2.08	2.3
July		891	1,260	1.89	2.1
August	1	819	2,550	3.82	4.4
September		990	1,410	2.11	2.3
October		633	821	1.23	1.4
November		704	1,030	1.54	1.7
December		954	2,510	3.76	4.3
The year	15,900	633	2,021	3.02	41.1

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT JUDSON, N. C.—Continued

		Discharges in	Second-fee	t		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1921						
January	4,100	1,500	2,170	3.25	0 77	
February	10,300	1,650	3,290	4.93	3.75 5.13	
March.	2,170	1,350	1,680	2.51	2.89	
April	4,900	1,220	1,910	2.86	3.19	
May	3,210	1,400	1,870	2.80	3.23	
June	2,410	1,120	1,280	1.92	2.14	
July	2,170	918	1,210	1.81	2.19	
August	1,950	891	1,100	1.65	1.90	
September	1,550	738	919	1.38	1.54	
October	1,260	570	756	1.13	1.30	
November	2,410	688	1,270	1.90	2.12	
December	3,500	1,080	1,750	2.62	3.02	
The year	10,300	570	1,600	2.40	32.30	
1922						
January	16,100	1,350	3,520	5.27	6.08	
February	7,700	2,060	2,930	4.39	4.59	
March	7,700	2,290	4,280	6.41	7.39	
April	5,600	2,410	3,220	4.82	5.38	
May	5,240	2,060	2,740	4.10	4.78	
June	2,930	1,350	1,930	2.89	3.25	
July	1,950	1,080	1,420	2.13	2.40	
August	1,220	584	901	1.35	1.50	
September	1,170	522	706	1.06	1.18	
October	1,040	450	579	.867	1.00	
November	450 10,800	360 400	395 2,160	.591 3.23	3.72	
The year	16,100	360	2,065	3.09	41.95	
January	5,240	1,260	2,080	3.11	3.58	
February	6,170	1,260	2,860	4.28	4.40	
March	6,170	1,750	2,710	4.06	4.68	
April	5,600	1,450	2,260	3.38	3.77	
May	6,170	1,750	2,840	4.25	4.90	
June	5,420	1,650	2,480	3.71	4.4	
July	1,850	900	1,350	2.02	2.38	
August	1,950	570	1,140	1.71	1.97	
September	1,950	400	774	1.16	1.29	
October	680	412	492	.737	.88	
November	1,530	506	769	1.15	1.28	
December	2,550	680	1,350	2.02	2.38	
The year	6,170	400	1,759	2.63	35.88	

LITTLE TENNESSEE RIVER AT CALDERWOOD, TENN.

- LOCATION. At wooden highway bridge at Calderwood, Blount County, 8 miles downstream from North Carolina-Tennessee State line, 10 miles below mouth of Cheoah River and 21 miles above McGhee.
- Drainage Area. 1,870 square miles (measured on topographic maps).
- RECORDS AVAILABLE. January 1, 1912 to December 30, 1918; January 1, 1921 to January 7, 1922; and April 1, 1922 to December 31, 1923.

 Gage. Vertical staff attached to downstream side of bridge pier; read by W. C.
- GAGE. Vertical staff attached to downstream side of bridge pier; read by W. C. Penn. In 1912-13, gage was Barret & Lawrence water-stage recorder on right bank 1,000 feet below bridge; in 1914-1918, a Friez water-stage recorder 1 mile farther downstream was used. Friez water-stage recorder, located on bridge pier, was used until January 7, 1922, since then a vertical staff gage has been used at same location.
- DISCHARGE MEASUREMENTS. Made from upstream side of highway bridge. Prior to January 1, 1921, made from cable 1,000 feet below bridge.
- CHANNEL AND CONTROL. Bed composed of coarse gravel and boulders; uniform throughout section. Left bank steep hill side; right bank low and subject to overflow at stage of about 10 feet. Control is rock and gravel shoal 300 feet below gage; probably permanent.
- EXTREMES OF DISCHARGE. Maximum mean daily discharge recorded, 70,000 second-feet March 4, 1917; minimum stage, 738.8 feet October 15, 16, November 20 and December 1, 1922 (discharge 320 second-feet), owing to regulation.
- ICE. Stage-discharge relation not affected by ice.

 REGULATION. Since December 1918, considerable regulation of flow has resulted from operation of power house at Tapaco, 10 miles above gage. Effort is made
- from operation of power house at Tapaco, 10 miles above gage. Effort is made to pass normal stream-flow at all times.

 Accuracy. Stage-discharge relation practically permanent. Three curves used,
- one for records previous to January 1921, being well defined, and the second used January 1, 1921 to September 30, 1922, being well defined below 30,000 second-feet. Last curve well defined except for extremely high water. Staff gage read to tenths twice daily, January 1-29, 1921 and April 1, 1922 to December 31, 1923. Operation of water-stage recorder satisfactory except for a few short periods. Daily discharge ascertained by applying to rating table the mean daily gage height obtained from staff gage readings or from graph of water-stage recorder. Records before January 7, 1922, good; others fair.
- of water-stage recorder. Records before January 7, 1922, good; others fair. Cooperation. For 1912-1918, complete records furnished by Aluminum Company of America; the company also furnished gage-height record for 1921-23.

MEAN WEEKLY DISCHARGE IN SECOND-FEET OF LITTLE TENNESSEE RIVER AT CALDERWOOD, TENN.

						Year				
Week	1912	1913	1914	1915	1916	1917	1918	1921	1922	1923
1	6,613	3,887	2,841	6,613	9,051	7,716	1,940	5,454	2,911	7,306
2	4,884	5,486	2,479	7,262	8,538	6,706	4,174	8,056	-,011	3,969
3	3,975	4,619	2,129	8,788	6,908	7,210	4,095	7,810		4,299
4	3,352	8,340	2,380	9,749	8,577		6,809	5,257		9,203
5	9,385	7,113	3,679	10,808	12,205	9,385	14,122	5,153		10,750
6	4,675	5,536	4,630	8,446	8,423	5,749	6,148	13,431		11,551
7	5,293	7,388	4,035	6,688	5,916	4,776	7,413	9,901		10,886
8	8,737	4,854	5,942	6,107	4,957		8,503	9,176		5,624
9	11,148	9,272	3,993	5,371	5,698	24,738	5,102	6,301		5,734
10	7,721	5,903	3,497	6,691	5,960		4,279	5,103		8,647
11	11,951	17,579	6,044	4,578	4,720		3,666	4,304		12,720
12	9,244	9,240	4,181	4,109	4,093		4,494	4,649		9,871
13	15,315	18,943	5,583	4,163	4,868	16,656	4,062	4,857		6,247
14	10,742	7,883	5,036	4,003	4,763	11,527	4,595	4,419	10,244	6,079
15	6,685	7,177	5,457	4,633	4,906	9,508	5,416	3,971	7,786	7,931
16	6,723	6,073	7,831	3,450	4,017		5,131	9,377	9,614	6,781
17	9,470	4,662	5,135	3,228	3,524	5,453	4,835	6,771	8,037	6,061
18	9,944	3,966	4,108	2,918	3,155	5,158	4,902	5,477	11,043	5,617
19	7,734	3,563	3,605	6,192	2,686	4,244	4,808	5,157	8,913	5,579
20	5,370	3,533	2,856	4,000	2,607	3,173	4,283	4,974	7,191	8,384
21	4,087	7,338	2,429	3,299	7,485	3,484	4,354	6,763	6,960	9,480
22	5,324	5,474	2,209	3,923	4,411	3,551	4,268	4,067	6,221	11,300
23	4,440	4,603	2,389	3,288	4,395	3,841	4,457	3,466	6,477	6,911
24	3,958	3,676	1,989	3,385	5,739	4,126	3,912	4,083	5,493	7,739
25	3,196	3,370	2,241	2,965	4,949	3,378	4.309	2,976	4,823	4,763
26	4,830	2,824	1,647	4,252	3,927	3,231	4,214	3,371	3,950	5,193
27	4,703	2,770	1,926	6,075	3,499	2,625	3,264	2,483	4,560	4,541
28	6,028	2,751	2,010	4,100	15,240	2,417	2,654	2,794	4,047	3,836
29	5,123	2,260	2,518	3,323	11,135	3,366	2,810	5,144	4,750	4,051
30	3,725	2,829	1,609	2,599	7,886	3,769	3,020	3,409	4, 131	3,309
31	4,188	3,201	1,630	2,311	6,299	3,266	2,913	3,679	3,029	3,430
32	3,262	2,588	1,900	2,129	6,091	2,818	2,590	3,451	2,736	4,217
33	3,241	2,368	2,027	2,229	4,821	2,436	2,440	4,394	2,851	3,211
34	3,010	2,377	1,519	2,820	3,608	2,160	2,176	3,939	2,709	2,987
35	2,590	2,329	1,750	2,103	3,012	3,364	2,299 2,741	3,307	2,646 1,986	2,520 2,134
36	2,242	1,894	1,257	2,704	2,854	3,282 2,251	2,196	2,179	2,329	2,134
37	2,310	1,794	1,170	2,155	2,592	2,231	2,190	2,004	2,003	2,123
38	3,144	2,652	1,260	2,130	2,366 2,571	2,974	2,106	2,353	1,830	2,120
39	3,921	1,944	1,188	1,849	2,011	2,353	1,789	2,786	1,019	2,377
40	2,353	1,910	1,487	6,762	1,977	2,199	1,680	1,817	799	1,183
41	2,057	1,606	1,236	3,006	3,226	2,375	1,840	1,901	556	877
42	2,658	2,070	6,991	3,751 3,345	2,519	2,307	6,644	1,821	864	1,196
43	2,164	3,083	2,086 1,634	2,457	2,429	2,367	16,560	2,047	1,032	1,424
44	2,066	2,234			2,163	2,257	4,576	1,837	860	1,856
45	2,613	2,184	1,770	2,257 3,310	2,708	2,037	4,082	3,954	604	1,544
46	2,193	2,297	2,346 1,880	4,967	2,810	1,777	3,939	4,419	510	1,594
47	1,953	2,068		3,294	2,879	1,791	4,835	5,799	726	1,633
48	1,844	2,177	5,801 10,759	2,573	3,039	2,043	2,485	4,991	3,766	3,693
49	4,032	3,244	4,324	2,935	3,384	2,140	3,509	2,583	6,593	2,890
50	2,606	2,415 2,085	4,761	14,068	3,367	2,160	13,366	4,119	11,171	3,433
51	2,424	3,255	12,493	11,503	6,701	2,186	8,623	4,376	3,975	3,961
52	3,315	0,200	12,430	11,000	0,.32					
	1	1	-	-	-					

Monthly Discharge of Little Tennessee River at Calderwood, Tenn. [Drainage area, 1,870 square miles]

	• 1	Discharges in	Second-feet			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1912						
January	17,100	3,090	5,590	2.99	3.4	
February	19,300	3,720	7,380	3.95	4.2	
March	36,100	6,770	10,600	5.67	6.5	
April	15,000	5,970	8,720	4.66	5.2	
May	11,400	3,720	6,450	3.45	3.9	
June	6,370	2,980	4,130	2.21	2.4	
July	7,580	3,030	4,750	2.54	2.9	
August	7,580	2,390	3,320	1.77	2.0	
September	7,330	1,990	2,870	1.53	1.7	
October	3,720	1,940	2,270	1.21	1.4	
November	4,570	1,800	2,170	1.16	1.9	
December	8,230	1,890	3,020	1.62	1.8	
The year	36,100	1,800	5,106	2.73	37.1	
1913	10, 100	0.570	F 700	0.10		
January	13,100	3,570	5,790	3.10	3.	
February	17,700	4,030	6,560	3.51	3.0	
March	47,000	4,570	12,400	6.63	7.0	
April	11,200	4,380	6,520	3.49	3.	
May	17,900	3,160	4,810 3,730	2.57	2.	
June	5,770 4,200	2,640 2,110	2,680	1.99	1.	
July	4,200	1,910	2,560	1.45	1.	
August	4,340	1,690	2,090	1.12	1.	
September	4,380	1,520	2,090	1.12	1.	
October	3,080	1,830	2,110	1.13	1.	
November	5,090	2,010	2,780	1.13	1.	
The year	47,000	1,520	4,519	2.42	32.	
1914 January	5,020	2,000	2,530	1.35	1.	
February	8,000	2,910	4,680	2.50	2.	
March	9,140	3,160	4,630	2.48	2.	
April	11,300	3,970	5,850	3.13	3.	
Aay	5,230	2,240	3,090	1.65	1.	
June	3,400	1,480	2,090	1.12	1.	
July	4,070	1,410	1,980	1.06	1.	
August	3,130	1,410	1,790	.95	1.	
September	1,500	930	1,230	.66	-	
October	19,400	951	2,830	1.51	1.	
November	14,900	1,480	2,360	1.26	1.	
December	25,000	3,900	8,290	4.43	5.	
The year	25,000	930	3,446	1.84	24.	

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT CALDERWOOD, TENN.—Continued

		Discharges i	n Second-fe	et	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1915					
January	13,000	4,720	7,990	4.27	4.92
February	16,700	4,930	7,920	4.24	4.42
March	8,950	3,840	4,900	2.62	3.02
April	6,070	3,070	3,830	2.05	2.29
May		2,610	4,020	2.15	2.48
June		2,360	3,500	1.87	2.09
July	8,760	2,240	3,980	2.13	2.46
August	4,040	1,980	2,350	1.26	1.45
September	4,800	1,720	2,190	1.17	1.30
October	11,000	2,470	4,060	2.17	2.50
November	7,870	2,220	3,350	1.79	2.00
December	40,700	2,360	7,580	4.05	4.67
The year	40,700	1,720	4,639	2.48	33.60
January	11,200	6,020	8,090	4.33	4.99
February	23,300	4,480	7,580	4.05	4.37
March	6,550	3,620	5,170	2.77	3.19
April	5,800	3,340	4,260	2.28	2.54
May	14,900	2,380	4,120	2.20	2.54
June	8,760	3,280	4,710	2.52	2.81
July	27,500	3,020	9,020	4.82	5.56
August	8,860	3,040	4,800	2.57	2.96
September	4,400	2,000	2,620	1.40	1.56
October	5,670	1,860	2,460	1.32	1.52
November	4,520	1,920	2,540	1.36	1.52
December	15,500	2,630	4,150	2.22	2.56
The year	27,500	1,860	4,960	2.65	36.12
May	5,700	2,360	3,890	2.08	2.40
June	4,800	2,820	3,670	1.96	2.19
July	5,020	2,200	3,030	1.62	1.87
August	5,020	1,960	2,550	1.36	1.57
September	8,310	1,960	2,920	1.56	1.74
October	6,240	1,140	2,320	1.24	1.43
November	2,360	1,560	2,000	1.07	1.19
December	2,260	1,920	2,130	1.14	1.31
January	32,400	1,350	5,750	3.08	3.55
February	12,600	5,360	7,600	4.07	4.24
March	4,800	3,460	4,170	2.23	2.57
April	8,310	3,780	4,950	2.65	2.96
May	6,020	3,780	4,550	2.43	2.80
June	7,430	3,970	4,210	2.25	2.51
July	4,720	2,960	3,000	1.60	1.84
August	3,130	1,820	2,440	1.30	1.50
September	3,490	1,720	2,370	1.27	1.42
October.	37,800	1,560	5,180	2.77	3.19
November	13,500	3,190	5,090	2.72	3.03
December*	38,200	400	6,870	3.67	4.23
The year	38,200	400	4,682	2.50	33.84

Low water Dec. 7 to 13 due to filling of Cheoah dam reservoir.

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT CALDERWOOD, TENN.—Continued

	1	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1921					
January	14,300	3,840	6,520	3.49	4.02
February	30,200	4,620	9,570	5.12	5.33
March	7,000	3,690	4,840	2.59	2.99
April	18,000	3,690	6,110	3.27	3.65
May	9,160	3,990	5,440	2.91	3.36
June	4,620	2,770	3,490	1.87	2.09
July	8,270	2,240	3,430	1.83	2.11
August	6,220	2,450	3,860	2.06	2.38
September	3,010	1,780	2,280	1.22	1.36
October	3,600	1,600	2,050	1.10	1.27
November	8,270	1,620	3,600	1.92	2.14
December	8,940	2,170	4,200	2.25	2.59
The year	30,200	1,600	4,616	2.47	33.29
1922	=				
January 1.7	3,260	2,690	2,910	1.56	.41
February					
March					
April	13,100	6,600	8,910	4.76	5.31
May	17,500	5,120	8,150	4.36	5.03
June	8,050	3,540	5,390	2.88	3.21
July	5,660	3,260	4,310	2.30	2.65
August		2,200	2,750	1.47	1.70
September		1,830	2,090	1.12	1.25
October		320	842	.450	.55
November	1,220	400	676	.361	.40
December	26,100	400	5,960	3.19	3.68
1923	10.000		0.700	0.50	1.00
January		3,550	6,580	3.52	4.06
February	18,000	4,860	9,270	4.96	5.16
March		4,860	9,000	4.81	5.54 3.98
April		4,510	6,670	3.57 4.26	4.9
May		4,860	7,960	3.51	3.92
June	11,600	4,510	6,560 3,910	2.09	2.41
July	5,600 5,990	2,840	3,910	1.78	2.41
August		2,340		1.15	1.28
SeptemberOctober		1,380 500	2,150 1,400	0.749	0.86
November		1,290	1,400	0.749	0.97
December		1,290	3,400	1.82	2.09
Detember	0,820	1,710	5,100	1.02	
The year	20,600	500	5,153	2.76	37.2

LITTLE TENNESSEE RIVER AT McGHEE, TENN.

LOCATION. At Louisville and Nashville Railroad bridge half a mile southwest of the railroad station at McGhee, Monroe County, half a mile below mouth of Tellico River, and 17 miles above junction with Tennessee River.

Drainage Area. 2,470 square miles (measured on topographic maps). Records Available. November 29, 1904 to December 31, 1923.

GAGE. Chain gage bolted to ties on upstream side of railroad bridge; read by Annie V. Hill. Previous to Dec. 1, 1905, was at railroad bridge 500 feet downstream. In moving gage to present location datum was raised 0.3 foot. In 1919, the datum used was 0.79 foot lower than that used in 1913. This difference was due principally to chain stretch, and corrections were made to account for the change.

DISCHARGE MEASUREMENTS. Made from downstream side of railroad bridge.

CHANNEL AND CONTROL. Banks are subject to overflow above gage height of
12 feet, but all water will pass under bridge and approaches. Bed is rocky and
probably permanent. Control practically permanent, though flood stages or

Tennessee River may affect gage readings at times.

Extremes of Discharge. Maximum stage recorded, 30.5 feet at noon April 2, 1920 (discharge approximately 118,000 second-feet); minimum discharge, 720 second-feet December 9, 1918 (caused by closing of Cheoah power dam) and October 2, 1919. Minimum discharge with no regulation occured November 29, 1964 (800 second-feet); probably discharge was somewhat less than this in October, 1904, before observations were started. The Urited States Weather Bureau reports a stage of 39.0 feet in March, 1867 (discharge not ascertained).

ICE. Stage-discharge relation not affected by ice.

REGULATION. None prior to December, 1918. Operation of power plant of Knoxville Power Co., 30 miles upstream causes some diurnal fluctuation at

gage.

Accuracy. Stage-discharge relation changed by backwater from Tennessee River at times during floods, by stretch of chain and change in location of gage. Three rating curves used, as follows: November 29, 1904 to December 31, 1905, fairly well defined between 1,500 and 30,000 second-feet; January 1, 1906 to September 30, 1918, fairly well defined between 1,500 and 30,000 second-feet; October 1, 1918 to December 31, 1923, well defined between 1,500 and 25,000 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good 1905-1913, and fair 1918-1919; for 1919-1923, good except for low stages when discharge for individual days may be greatly in error due to power plant regulation.

COOPERATION. From 1904 to 1918, gage heights were furnished by United States

Weather Bureau.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET

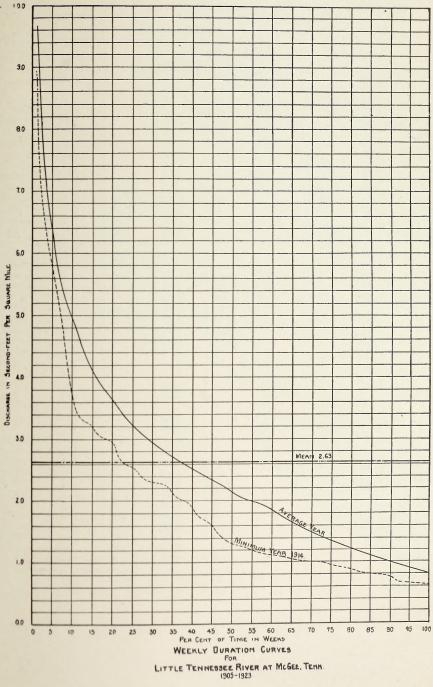
		Year								
Week	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913
1		1,830	12,050	10,443	11,949	8,616	5,813	16,689	8,336	6,341
2		9,824	7,814	6,741	13,531	6,280	6,836	5,970	6,073	7,411
3		5,926	7,109	5,996	9,289	11,247	5,567	4,596	4,760	7,539
4		3,026	16,389	5,489	6,664	5,764	6,603	4,100	4,597	14,699
5	7	3,124	7,861	9,004	6,650	4,069	5,056	5,010	11,777	10,763
6		13,576	5,609	9,001	6,543	10,576	4,533	12,446	5,419	7,449
7		8,537	4,707	5,760	15,924	14,166	6,936	7,866	6,800	11,686
8		16,369	4,907	5, 157	9,077	17,814	8,851	5,416	11,633	6,387
9		7,433	6,070	8,903	8,353	11,294	11,511	5,041	14,118	15,447
10		8,254	6,393	9,014	8,021	13,563	6,960	6,533	10,703	7,846
11		7,076	8,430	8,324	9,579	19,114	5,424	5,384	15,989	27,031
12		6,674	9,310	5,993	14,009	10,534	4,560	5,191	12,606	13,729
13		5,457	9,880	5,313	10,027	13,914	3,890	7,267	22,846	26,486
14		5,396	8,023	5,420	6,783	8,399	3,521	16,777	17,029	10,934
15		7,067	10,169	5,304	5,491	7,616	3,461	15,186	9,031	8,904
16		4,943	8,927	7,103	7,576	6,799	6,831	13,346	9,586	8,189
17		5,073	6,030	8,654	9,521	7,246	5,154	8,611	15,974	6,223
18		7,679	5,876	6,839	6,989	16,094	4,600	7,363	15,957	5,303
19		6,560	5,387	9,837	7,287	8,589	9,396	5,680	10,909	4,891
20		7,710	3,994	6,834	6,344	6,661	7,390	4,777	7,356	4,710
21		7,233	3,837	5,346	6,187	18,857	12,546	4,894	5,681	12,327
22		5,354	5,096	6,440	5,574	9,329	7,821	3,687	7,504	7,824
23		3,697	4,534	7,279	4,896	22,529	10,846	3,563	5,606	6,081
24		3,529	8,454	6,246	5,019	10,663	8,186	2,796	5,164	4,827
25		4,737	6,606	5,009	3,856	8,107	6,461	3,186	4,419	4,206
26		5,391	7,039	8,447	3,474	8,359	6,611	3,279	7,026	3,471
27		4,189	5,644	4,791	6,073	9,307	9,960	2,723	7,131	3,493
28		8,949	7,701	5,319	5,394	13,393	8,613	3,864	7,820	3,581
29		5,734	15,029	4,204	3,970	6,974	7,250	3,846	6,543	2,450
30		4,301	10,023	3,361	3,021	7,021	5,499	4,914	5,206	3,159
31		3,029	8,694	3,396	2,781	10,747	6,326	3,423	5,629	3,446
32		5,293	6,603	3,093	5,500	6,760	5,544	3,330	4,566	3,124
33		6,869	6,763	3,527	2,934	8,613	3,890	2,816	4,347	2,779
34		6,050	7,111	3,266	7,389	4,863	4,250	2,121	4,136	2,729
35		3,706	10,006	2,557	4,236	3,821	4,827	2,473	3,374	2,123
36		2,951	8,651	2,659	3,817	3,357	4,647	2,947	2,853	2,081
37		2,460	7,597	2,809	2,684	3,571	3,267	2,433	2,890	1,946
38		2,090	9,380	3,687	2,253	5,047	2,709	2,256	3,850	2,623 2,123
39		1,811	9,771	6,556	2,117	4,226	2,920	2,673	5,654	2,123
40		2,114 3,116	21,671 10,341	4, 180 3, 247	1,919 2,630	2,850 3,386	2,757	2,071 2,824	2,964 2,810	1,897
										2,809
42	7	2,139 2,221	8,114 6,270	2,523 2,539	1,854 2,990	5,286 3,050	2,323 2,094	6,921 3,161	3,603 2,883	3,750
43		1,839	5,001	3,360	3,420	2,764	2,094	2,329	2,883	2,806
		1,839	4,344	3,360	2,373	2,764	1,961	4,023	3,614	2,800
45		1,834	4,344	3,991	3,031	2,446	1,961	4,023	2,764	2,820
47		1,710	30,543	9,483	2,471	2,617	1,793	4,799	2,497	2,664
48		1,840	8,319	6,076	2,789	2,450	2,534	3,654	2,274	2,609
49		9,367	6,824	3,756	8,967	4,217	7,286	2,906	7,019	3,981
50		8,184	6,910	7,166	6,559	6,373	3,147	2,854	3,790	3,153
51		6,846	9,819	5,573	6,931	4,084	2,526	5,727	3,334	2,524
52		7,544	8,015	9,619	7,370	3,485	4,315	12,563	5,346	4,309
02	2,500	1,011	0,010	0,019	1,010	0,100	1,010	12,000	0,010	2,000

OF LITTLE TENNESSEE RIVER AT McGHEE, TENN.

			1		Year					
1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	TILL T
4,250	9,729	14,714	12,483	2,366	19,964	2,674	5,517	3,723	7,851	
3,241	10,807	14,300	7,930	5,066	8,537	3,987	9,430	6,490	4,320	
2,879	11,654	10,197	11,631	5,664	7,913	6,289	10,149	17,407	4,587	
3,373	14,686	13,017	11,553	7,323	12,604	13,683	6,137	28,086	12,459	
5,117	17, 291	17,829	13,146	32,329	8,100	8,439	6,253	7,663	16,200	
6,426	11,820	11,943	7,819	21,866	5,989	7,869	21,987	6,741	16,457	7
5,730	9,134	8,066	6,680	11,126	7,506	5,549	14,703	17,276	14,589)
8,126	8,347	6,840	22,186	12,217	10,500	7,289	10,240	9,033	6,760	
5,044	7,611	8,875	26,057	7,246	10,669	5,061	7,260	15,179	6,341	
4,746	9,184	9,497	37,386	6,357	16,356	6,633	5,794	18,871	12,001	
8,609	6,580	6,904	19,071	5,493	9,889	20,216	4,714	18,814	18,214	1
6,116	6,264	5,796	22,914	6,216	7,464	14,006	5,284	11,100	13,133	;
8,059	5,839	7,171	27,371	5,730	8,646	13,563	6,244	15,046	7,740)
7,423	5,680	6,586	17,471	5,621	6,099	42,557	5,554	12,257	7,000)
7,537	7,296	7,397	13,729	7,633	5,774	13,133	3,986	8,730	9,999)
12,406	5,343	5,797	8,990	7,956	8,466	8,930	13,359	12,776	8,066	5
7,327	4,416	5,261	7,187	6,429	5,227	8,710	7,739	9,560	7,504	1
5,746	4,073	4,524	6,869	6,649	8,779	9,057	6,559	12,453	6,761	1
5,117	9,003	3,787	5,720	5,304	7,784	9,104	6,039	10,344	6,606	3
3,894	5,661	3,834	4,671	6,307	6,504	6,637	5,884	7,771	10,596	ò
3,171	4,453	10,151	4,530	6,391	7,067	5,814	6,647	7,817	13,629)
2,736	6,563	6,013	4,533	4,574	5,436	4,321	4,559	6,689	14,243	3
3,094	4,824	5,951	5,441	4,901	3,561	5,461	3,691	7,297	8,414	1
2,550	4,337	8,173	5,687	4,216	3,639	2,650	3,384	7,036	9,329	9
2,846	3,826	6,781	4,984	6,799	3,433	5,163	3,469	5,437	5,760)
2,027	5,674	5,504	4,193	5,136	8,703	3,140	3,793	4,046	5,961	
2,431	8,203	4,649	3,174	3,890	3,173	3,806	2,597	5,131	4,784	
2,266	5,417	20,331	2,840	2,950	3,027	2,331	3,070	4,210	3,997	
4,157	4,316	16,243	5,090	3,044	4,180	5,014	6,139	4,980	4,554	4
1,919	3,051	11,760	5,857	3,914	3,930	3,346	3,809	4,929	4,124	
2,216	3,069	7,769	3,909	4,217	2,650	3,073	4,436	3,264	4,634	
2,466	2,450	8,483	3,716	2,929	2,824	6,444	4,159	2,900	4,520	
2,606	2,723	7,441	3,466	2,810	2.924	1,914	4,913	2,793	3,99	
1,941	3,416	5,341	2,829	2,991	2,537	11,331	4,061	2,556	3,35	
2,127	2,617	4,204	5,244	2,451	2,539	9,136	3,996	2,480	2,87	
1,606	3,481	3,896	4,614	2,896	1,750	6,964	2,513	2,079	2,76	
1,551	2,409	3,499	2,611	2,624	1,513	10,884	2,280	2,756	2,30	
1,653	2,609	2,823	2,383	2,923	1,184	5,500	2,054	2,389	2,33	
1,626	1,941	3,141	3,949	2,534	906	4,016	2,493	2,053	2,28	
1,956	7,723	2,656	2,647	1,814	1,007	3,347	3,273	1,673	2,57	
1,566	3,953	2,450	2,403	1,674	2,080	2,786	1,956	1,604	1,88	
10,370	3,980	4,090	4,073	1,793	2,897	2,676	1,934	1,453	1,47	
2,661	4,267	2,957	2,841	6,939	6,374	2,541	2,209	1,629	1,59	
2,184	2,907	2,833	3,280	27,496	2,471	2,669	2,960	1,539	1,54	
2,357	2,550	2,456	2,681	5,750	2,101	2,567	2,080	1,653	1,95	
2,803	4,541	3,139	2,450	4,690	3,211	3,303	4,367	1,474	1,70	
2,500	5,944	2,866	2,276	5,304	2,103	3,203	5,320	1,523	1,75	
5,559	4,396	3,811	2,311	6,171	2,226	3,751	7,561	1,459	1,76	
15,866	3,390	3,767	2,323	3,463	4,841	5,134	7,411	5,690	3,65 4,02	
5,667	3,446	4,813	1,817	5,427	18,513	15,630	3,664	9,797	4,02	
6,343		4,033	2,169	18,460	4,977	10,739	4,421	16, 251	4,32	
21,713		9,803	2,430	12,981	3,813	10,224	5,889	4,641	4,89	r.

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT McGHEE, TENN. [Drainage area, 2,470 square miles]

Month 1904 December	Maximum 8,850	Minimum	Mean	Per Square Mile	Run-off in Inches
December	8,850				
December	8,850				
	0,000	830	1,740	0.704	0.81
		330	1,740	0.704	0.8.
January	35,000	1,430	4,960	2.01	2.35
February		2,600	11,000	4.45	4.6
March	15,600	5,230	6,880	2.79	3.25
April	12,800	3,970	5,840	2.30	2.6
May	12,500	4,470	6,930	2.81	3.2
June	8,270	3,020	4,310	1.74	1.94
July	19,800	3,250	5,660	2.29	2.64
August	11,500	2,800	5,170	2.09	2.41
September	4,470	1,790	2,420	.980	1.09
October	7,420	1,650	2,360	.955	1.10
November	2,600	1,650	1,810	.733	.82
December	16,900	1,650	7,590	3.07	3.54
The year	38,800	1,430	5,411	2.19	29.58
1906					
January	38,800	4,630	10,700	4.33	4.99
February	7,640	4,130	5,340	2.16	2.25
March	16,200	4,380	8,200	3.32	3.83
April	16,600	5,680	8,320	3.37	3.76
May	6,780	3,420	4,780	1.94	2.24
June	16,200	3,650	6,570	2.66	2.97
July	21,800	4,130	9,380	3.80	4.38
August	15,000	5,150	7,590	3.07	3.54
September	20,500	3,200	8,990	3.64	4.06
October	36,200	5,150	11,000	4.45	5.13
November	70,000	4,130	11,300	4.57	5.10
December.	. 16,900	5,150	8,140	3.30	3 .80
The Year	70,000	3,200	8,359	3.38	46 .05
1907	15 000	4 620	6.040	0.01	3.24
January	15,900	4,630 4,630	6,940 7,490	2.81 3.03	3.24
February	21,200 14,000	4,630	7,490	3.06	3.53
MarchApril	11,200	4,630	6,630	2.68	2.99
	11,500	4.630	6,950	2.81	3.24
May June	16,600	4.380	6,910	2.80	3.12
	9,720	2,990	4.490	1.82	2.10
JulyAugust	4,130	2,990	3,140	1.82	1.46
September	13,100	1,940	3,820	1.55	1.73
October	5,150	2,250	3,090	1.25	1.44
November	23,500	2,250	5,680	2.30	2.57
December	20,200	3,420	6,500	2.63	3.03
The year	23,500	1.940	5,767	2.33	31.61



MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT McGHEE, TENN.—Continued

]	Discharges in	Second-feet	,		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1908						
January	27,000	5,410	9,910	4.01	4.62	
February	27,700	5,950	9,610	3.89	4.20	
March	26,300	6,780	10,400	4.21	4.8	
April	18,500	5,150	7,370	2.98	3.35	
May	10,300	4,890	6,580	2.66	3.07	
June	6,500	2,990	4,420	1.79	2.00	
July	11,800	2,790	4,470	1.81	2.00	
August	13,100	2,420	4,740	1.92	2.0	
September	5,950	1,940	2,760	1.12	1.2	
October			2,700	1.12	1.1	
November	5,410	1,650		1.05	1.1	
	3,650	2,250	2,590			
December	21,500	2,250	7,230	2.93	3.38	
The year	27,700	1,650	6,052	. 2.45	33.38	
1909	02.000	B 000	7,620	3.09	3.50	
JanuaryFebruary	23,200 32,100	3,890	12,700	5.14	5.3	
	37,300	3,420 8,220	13,800	5.59	6.44	
March				3.09	3.45	
April.	10,600	5,950	7,630 12,200	4.94	5.70	
May	38,100 39,200	5,950	12,200	4.94	5.56	
June	24,200	7,350	9,020	3.65	4.2	
JulyAugust	19,500	5,150	7,170	2.90	3.34	
	19,500	3,650	4,020	1.63	1.89	
September		2,990	3,570	1.45	1.6	
October November	10,000 3,420	2,600 2,250	2,550	1.45	1.18	
December	15,300	2,250	4,360	1.76	2.08	
The year	39,200	2,250	8,080	3.27	44.28	
1910						
January	13,100	3,650	6,090	2.47	2.88	
February	20,200	3,650	6,430	2.60	2.71	
March	21,200	3,650	6,620	2.68	3.09	
April	14,600	3,200	4,720	1.91	2.13	
May	19,500	4,130	8,610	3.49	4.02	
June	22,500	5,150	7,940	3.21	3.58	
July	13,700	4,630	7,690	3.12	3.60	
August	8,220	2,990	4,680	1.89	2.18	
September	10,000	2,420	3,690	1.49	1.66	
October	4,630	1,940	2,650	1.07	1.23	
November	4,380	1,650	2,030	.822	.92	
December	24,200	1,650	4,160	1.68	1.94	
The year	24,200	1,650	5,450	2.21	29.91	

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT McGhee, Tenn.—Continued

	4	et			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1911			*		
January	32,100	3,890	7,580	3.07	3.54
February		4,380	7,650	3.10	3.23
March	9,720	4,630	5,970	2.42	2.79
April	40,300	5,410	13,000	5.26	5.87
May	9,120	3,420	5,370	2.17	2.50
June	4,890	2,600	3,260	1.32	1.47
July	12,200	* 2,420	3,720	1.51	1.74
August	5,410	1,650	2,810	1.14	1.31
September	4,890	2,090	2,630	1.06	1.18
October	23,500	1,790	3,630	1.47	1.70
November	7,060	2,090	4,120	1.67	1.86
December	24,900	2,600	6,060	2.45	2.82
The year.	40,300	1,650	5,470	2.21	30.01
1912					0.01
January	27,400	3,420	6,930	2.81	3.24
February		4,630	9,460	3.83	4.13
March	42,600	8,220	14,700	5.95	6.86
April	31,700	8,220	13,700	5.55	6.19
May	18,200	5,150	9,110	3.69	4.25 2.52
June	11,200	4,130	5,590	2.26	3.02
July		3,890	6,470	2.62 1.83	2.11
August	9,120	3,200	4,530	1.53	1.70
September	11,200	2,600	3,750		1.40
October	5,150	2,420	3,000	1.21 1.15	1.40
November	6,220 13,700	2,250 $2,250$	2,830 4,720	1.13	2.20
The year	42,600	2,250	7,060	2.86	38.90
1913 January	25,600	5,680	9,300	3.77	4.35
February	43,000	5,410	9,880	4.00	4.16
March	52,100	6,220	18,000	7.29	8.40
April	16,900	5,950	8,750	3.54	3.95
May.	36,900	4,130	7,080	2.87	3.31
June	7,930	3,200	4,920	1.99	2.22
July	6,500	2,250	3,140	1.27	1.46
August	4,380	1,940	2,880	1.17	1.35
September	2,990	1,650	2,190	.887	.99
October	5,410	1,790	2,740	1.11	1.28
November	3,890	2,090	2,640	1.07	1.19
December	7,060	2,420	3,530	1.43	1.65
The year	52,100	1,650	6,254	2.53	34.31

Monthly Discharge of Little Tennessee River at McGhee, Tenn.—Continued

	1	Discharges in	Second-feet	;	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1914			1.0		
January	5,410	2,600	3,410	1.38	1.5
February	12,500	4,380	6,610	2.68	2.7
March.	13,700	4,380	6,470	2.62	3.0
April	17,500	5,950	8,660	3.51	3.9
May	8,220	2,790	4,200	1.70	1.9
June	3,890	1,940	2,660	1.08	1.2
July	6,220	1,790	2,680	1.09	1.2
August	3,650	1,790	2,260	.915	1.0
September	2,250	1,220	1,620	.656	.7
October	38,100	1,220	3,950	1.60	1.8
November	5,410	1,860	2,540	1.03	1.1
December	60,100	3,420	12,700	5.14	5.9
The year	60,100	1,220	4,813	1.95	26.4
1915 January	21,500	7,060	11,500	4.66	5.3
February	41,500	6,500	11,500	4.66	4.8
March	14,000	5,410	6,950	2.81	3.2
April	12,200	4,130	5,710	2.31	2.5
May.	20,800	3,420	5,650	2.29	2.6
June	13,100	2,990	4,950	2.00	2.2
July	15,000	2,600	5,220	2.11	2.4
August	4,890	2,250	2,900	1.17	1.3
September	8,220	1,650	2,590	1.05	1.1
October	11,800	2,990	4,790	1.94	2.2
November	10,600	2,420	4,180	1.69	1.8
December.	54,800	2,790	11,300	4.57	5.2
The year	54,800	1,650	6,437	2.60	35.2
January	25,600	7,060	12,600	5.10	5.8
February	37,300	5,950	10,800	4.37	4.7
March	13,700	5,410	7,850	3.18	3.6
April	8,820	4,890	6,200	2.51	2.8
May	27,000	3,420	5,720	2.32	2.6
June	12,800	4,630	6,540	2.65	2.9
July	35,400	3,890	12,600	5.10	5.8
August	11,200	4,130	6,730	2.73	3.1
September	5,410	2,250	3,380	1.37	1.5
October	10,000	2,250	3,040	1.23	. 1.4
November	4,890	2,020	2,890	1.17	1.3
December	29,200	2,600	5,690	2.30	2.6
The year	37,300	2,020	7,003	2.84	38.6

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT McGhee, Tenn.—Continued

		Discharges i	n Second-fee	et	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1917					
January	20,500	5,410	10,900	4.41	5.08
February	36,900	5,680	12,500	5.06	5.27
March	89,000	13,100	28,300	11.50	13.26
April	27,400	6,780	11,900	4.82	5.38
May	7,640	3,890	5,230	2.12	2.44
June	10,600	3,420	5,080	2.06	2.30
July	9,420	2,600	4,180	1.69	1.95
August	5,410	2,020	3,340	1.35	1.56
September	13,700	2,090	3,950	1.60	1.78
October	11,800	2,090	3,050	1.23	1.42
November	3,420	1,940	2,490	1.01	1.13
December	3,200	1,520	2,230	.903	1.04
The year	89,000	1,520	7,763	3.14	42.61
1918	00.400	4 400	0.450	0.00	1.10
January	62,400	1,460	9,470	3.83	4.42
February	26,300	7,060	11,900	4.82	5.02
March	7,640	4,380	6,040	2.45	2.82
April	13,100	4,380	6,820	2.76	3.08
May	10,300	4,380	6,010	2.43	2.80
June	16,200	3,200	5,080	2.06 1.51	2.30
July	6,780	2,420	3,730	1.19	1.74
August	4,890	2,090	2,930	1.19	1.23
September	4,380	2,020	2,720 7,020	2.84	3.27
October	63,000	1,340		2.73	3.05
November	25,100 59,000	3,980 720	6,750 9,880	4.00	4.61
The year	63,000	720	6,529	2.64	35.71
1919					
January	37,600	5,940	12,000	4.86	5.60
February	22,600	5,170	8,400	3.40	3.54
March	24,800	6,480	10,500	4.25	4.90
April	14,000	4,680	6,430	2.60	2.90
May	16,800	3,530	7,400	3.00	3.46
June	12,800	2,700	4,720	1.91	2.13
July	6,750	2,510	3,610	1.46	1.68
August	4,440	2,510	2,720	1.10	1.27
September	2,700	820	1,420	.575	1.41
October	17,500	720	3,010	1.22	1.41
November	4,440	1,980	2,570	1.04	3.56
December.	43,600	2,700	7,640	3.09	06.6
The year	43,600	720	5,868	2.38	32.25

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT McGHEE, TENN.—Continued

		I	Discharges in Second-feet					
	Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches		
	1920		1					
January		32,900	1,810	6,870	2.78	3.20		
		14,300	3,980	6,870	2.78	3.00		
		44,500	4,210	12,500	5.06	5.83		
April		89,000	4,920	17,800	7.21	8.04		
		11,000	3,980	7,260	2.94	3.39		
		11,300	2,330	4,100	1.66	1.85		
		8,690	2,150	3,560	1.44	1.66		
		39,400	2,510	10,500	4.25	4.90		
		25,100	3,530	6,900	2.79	3.11		
		3,750	2,330	2,800	1.13	1.30		
		5,170	2,330	3,110	1.26	1.41		
		46,400	3,100	10,000	4.05	4.67		
The yea		89,000	1,810	7,689	3.11	42.30		
Tanuana	1921	20,200	3,530	7,700	3.12	3.60		
	• • • • • • • • • • • • • • • • • • • •		5,420		5.43	5.6		
,		60,000 9,530	3,750	13,400 5,580	2.26	2.6		
		36,300	3,530	7,370	2.98	3.33		
		11,000	4,210	6,080	2.46	2.8		
		6,210	2,700	3,630	1.47	1.64		
		17,500	2,330	3,950	1.60	1.8		
		8,410	2,700	4,370	1.77	2.0		
-		3,750	1,810	2,390	.968	1.0		
		4,680	1,650	2,350	.951	1.10		
		13,400	1,810	4,530	1.83	2.0		
December	• • • • • • • • • • • • • • • • • • • •	12,500	2,900	5,430	2.20	2.54		
The year	1922	60,000	1,650	5,565	2.25	30.30		
January		83,500	3,310	13,400	5.43	6.2		
February		43,100	3,530	10,000	4.05	4.2		
March		52,100	6,750	16,500	6.68	7.70		
April		24,000	7,290	11,200	4.53	5.0		
May		18,900	5,680	9,120	3.69	4.2		
June		11,000	3,750	6,150	2.49	2.7		
July		7,570	3,750	4,720	1.91	2.20		
August		4,440	1,980	2,770	1.12	1.2		
September.		4,680	1,200	2,310	.935	1.0		
October		1,980	1,070	1,580	.640	.74		
November.		1,980	1,070	1,550	.628	.70		
		51,600	1,200	8,460	3.43	3.9		
The yea	ar	83,500	1,070	7,313	2.96	40.1		

MONTHLY DISCHARGE OF LITTLE TENNESSEE RIVER AT MCGHEE, TENN.-Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1923						
January	26,600	3,530	7,970	3.23	3.72	
February	32,900	5,680	12,700	5.14	5.35	
March	39,000	4,920	12,100	4.90	5.65	
April	23,700	5,170	8,110	3.28	3.66	
May	21,600	5,680	10,200	4.13	4.76	
June	15,900	5,170	7,950	3.22	3.59	
July	6,750	3,100	4,440	1.80	2.08	
August	5,170	2,700	3,850	1.56	1.80	
September	3,310	1,980	2,450	0.992	1.11	
October	2,790	1,000	1,840	0.745	0.86	
November		1,470	1,760	0.713	0.80	
December	10,200	1,890	4,100	1.66	1.91	
The year	39,000	1,000	6,456	2.61	35.29	

CULLASAGEE RIVER AT CULLASAJA, N. C.

LOCATION. At wooden highway bridge at Cullasaja, Macon County, 3½ miles above mouth of river and 5 miles below Cullasagee falls. Ellijay Creek enters 1 mile above.

Drainage Area. 87 square miles (measured on topographic maps).

RECORDS AVAILABLE. June 13, 1907 to December 31, 1909; February 12, 1921 to December 31, 1923.

Gage. Vertical staff attached to left abutment of bridge during 1907-1909, and during 1921-1923, fastened to face of rock bluff on right bank 50 feet above

bridge. Datum unchanged.

DISCHARGE MEASUREMENTS. Made from highway bridge.

CHANNEL AND CONTROL. Bed composed of rock and boulders; permanent.

Channel straight for 200 feet above and below gage. Banks high and not subject to overflow. Control is riffle just below bridge, formed of solid rock

and boulders; practically permanent.

Extremes of Discharge. Maximum stage recorded, 10.10 feet at 7 a.m. May 23, 1923 (discharge, 3,740 second-feet); minimum stage, 0.66 foot at 7 a.m. November 29, 1922 (discharge, 58 second-feet).

ICE. Stage-discharge relation not affected by ice during periods of record.

REGULATION. Several mills above station, but effect of their operation believed to

be negligible. ACCURACY. Stage-discharge relation permanent. Rating curve well defined between 70 and 800 second-feet; extended beyond these limits. Gage read probably to half-tenths once daily during 1907-1909; during 1921-1923, read to hundredths twice daily. Daily discharge ascertained by applying daily or mean daily gage height to rating table. Records good, except for extremely

high and low stages, for which they are fair. Cooperation. Records during 1907-1909, obtained in cooperation with United

States Forest Service.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF CULLASAGEE RIVER AT CULLASAJA, N. C.

	Year									
Week	1907	1908	1909	1921	1922	1923				
1		970	905		190	45				
2		379	285		189	45				
3		622 382	229 267		372 673	18 15				
4		260	213		644	31				
5		275	192		343	28				
6		256	285		381	43				
7		939	585	456	658	41:				
8		421	> 894	422	388	26				
9		321	425	278	497	25				
10		281	429	241	632	24				
11		265	838	197	609	54				
12		543	520	237	482	45				
13		365	528	241	1,021	269				
14		264	383	214	657	30				
15		230	448	218	439	50				
16		297	304	531	496	33:				
17		627	360	358	346	29				
18		343	506	288	562	28				
19		336	492	264	449	32				
20		252	700	275	369	42				
21		242	1,117	381	461	80				
22		208	530	214	419	86				
23		175	956	195	355	489				
24	178	206	432	194	266	354				
25	208	185	392	144	260	26'				
26	213	143	622	176	180	27:				
27	161	195	360	130	159	229				
28	153	234	371	129	157	~ 20				
29	120	147	226	185	219	24				
30	105	127	221	187	167	159				
31	101	103	277	181	123	14:				
32	96	138	233	149	112	15				
33	113	100	534	151	138	133				
34	110	334	208	142	101	110				
35	85	153	188	109	86	117				
36	94	169	136	89	79	115				
37	82	95	164	103	95	85				
38	142	91	390	100	79	110				
39	177	93	231	132	79	105				
40	103	78	136	113	77	79				
41	87	127	289	84	94	78				
42	77	80	224	81	72	94				
43	78	247	162	78	80 69	86				
44	129	231	129	135		151 173				
45	94	135	119	113	69 69					
46 47	131	146	127	149 234	74	96				
48	413 191	122 154	125 119	234 266	74 75	159				
49			538	246	136	243				
50	161 398	396 251	667	156	193	205				
51	457	292	282	288	482	246				
						193				
52	468	255	198	308	243					

MONTHLY DISCHARGE OF CULLASAGEE RIVER AT CULLASAJA, N. C. [Drainage area, 87 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907					
July	190	100	136	1.56	1.80
August	164	78	100	1.15	1.33
September	550	69	121	1.39	1.58
October	126	69	86.2	.991	1.14
November	905	78	205	2.36	2.6
December	995	126	338	3.89	4.4
1908					
January	1,220	230	393	4.52	5.23
February	1,900	230	479	5.51	5.9
March	1,220	220	362	4.16	4.80
April	1,310	190	354	4.07	4.5
May	550	210	280	3.22	3.7
June	309	140	180	2.07	2.3
July	378	112	171	1.97	2.2
August	770	88	174	2.00	2.3
September	350	83	110	1.26	1.4
October	635	74	154	1.77	2.0
November	200	100	130	1.49	1.6
December	1,260	156	296	3.40	3.9
The year	1,900	74	257	2.95	40.1
1909		200	244	0.00	0.00
January	474	200	244	2.80	3.2
February	1,440	164	519	5.97	6.2
March	2,160	296	573	6.59	7.6
April	1,040	261 296	381 672	4.38 7.72	8.9
May	2,880		592	6.80	7.5
June	2,120	250 181	311	3.57	4.1
July	995	156	303	3.48	4.0
August	1,900 1,620	126	225	2.59	2.8
September	474	126	196	2.25	2.5
October	156	119	124	1.43	1.6
November	2,120	119	401	4.61	5.3
The year	2,880	112	378	4.35	58.9
1921			=======================================		
February 12-28	680	296	415	4.77	3.0
March	350	181	231	2.66	3.01
April	995	172	328	3.77	3.87
May	680	210	292	3.36	2.31
June	296	126	180	2.07 1.82	2.31
July	350	112	158		1.98
August	378	100	150	1.72	1.36
September	200	83 78	106 93.6	1.22	1.24
October	181				
October November December	350 635	88 140	168 261	1.93	2.15

MONTHLY DISCHARGE OF CULLASAGEE RIVER AT CULLASAJA, N. C.—Continued

		t			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1922		-			
January	1,900	172	456	5.24	6.04
February	1,360	309	443	5.09	5.30
March	1,540	378	674	7.75	8.94
April	995	309	488	5.61	6.26
May	1,040	296	452	5.20	6.00
June	680	164	294	3.38	3.77
July	350	133	168	1.93	2.22
August	272	83	112	1.29	1.49
September	126	69	83.2	.956	1.07
October	126	65	79.8	.917	1.06
November	88	61	69.7	.801	.89
December	1,670	74	252	2.90	3.34
The year	1,900	61	298	3.42	46.38
1923 January	1,080	148	279	3.21	3.70
February	905	230	349	4.01	4.18
March	1,180	190	363	4.17	4.81
April	1,260	220	352	4.05	4.52
May	1,670	240	536	6.16	7.10
June	815	230	383	4.40	4.91
July	550	126	206	2.37	2.73
August	220	100	134	1.54	1.78
September	250	78	103	1.18	1.32
October	164	74	83.1	.955	1.10
November	550	78	138	1.59	1.77
December.	408	140	217	2.49	2.87
The year	1,670	74	262	3.01	40.79

NANTAHALA RIVER NEAR NANTAHALA, N. C.

LOCATION. At Mathew Cole's footbridge just above Nelsons Creek and about 1 mile up the river from Nantahala, Swain County.

Drainage Area. 144 square miles.

RECORDS AVAILABLE. May 22, 1907 to December 31, 1909, when the station was discontinued.

Gage. Staff gage attached to right bank abutment of bridge; read by Mathew Cole.

DISCHARGE MEASUREMENTS. Made from footbridge.
CHANNEL AND CONTROL. Bed rough and rocky; current swift and considerably broken. Control not known. Both banks low but will seldom be overflowed. EXTREMES OF DISCHARGE. Maximum stage recorded, 4.4 feet June 4, 1909 (discharge not determined); minimum discharge, 152 second-feet numerous days in November and December, 1909.

ICE. Stage-discharge relation seldom if ever affected by ice.

REGULATION. None.

Accuracy. Stage-discharge relation fairly permanent. Rating curve fairly well defined between 200 and 700 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF NANTAHALA RIVER AT NANTAHALA, N. C.

		Year			Year			
Week	1907	1908	1909	Week	1907	1908	1909	
		1						
-								
1			445	27	376	355	569	
2			451	28	364	376	650	
3				29	347	303	444	
4			437	30	297	265	393	
		470	340	31	302	254	405	
		470	425	32	261	346	411	
7				33	339	263	296	
8				34	306	365	266	
9				35	241	314	229	
10				36	226	293	225	
11				37	227	246	250	
12				38	177		278	
13				39	353	208	274	
14			680	40	325	193	214	
15		438	589	41	269	223	236	
16			468	42	222	167	328	
17			535	43	237	240	223	
18			656	44	260	289	199	
19			568	45	285	226	155	
20		440	485	46	312	239	185	
21		429	100	47	344	222	174	
22		395		48	387	233	152	
23	440			49	325	282	255	
24	448	374		50	020	449	359	
25	411	363	617	51	406	384	222	
	385	310		52	460	424	220	
26	393	273	644	04	100			

NANTAHALA RIVER AT WESSER, N. C.

LOCATION. At Wesser railroad station on Murphy branch of Southern Railway in Swain County, 500 feet below upper railroad bridge, one-fourth mile below mouth of Silvermine Creek, one-fourth mile above mouth of Wesser Creek and 4 miles upstream from Almond, at junction of Nantahala and Little Tennessee rivers.

DRAINAGE AREA. 160 square miles (measured on topographic maps).
RECORDS AVAILABLE. April 15 to September 30, 1920; November 1, 1920 to April 30, 1921, when station was discontinued.

Gage. Enameled-faced vertical staff on left bank 500 feet downstream from upper Southern Railway bridge; read by J. Z. Wright.

DISCHARGE MEASUREMENTS. No suitable measuring section near. Measurements

made at Almond, 4 miles below, have been used. CHANNEL AND CONTROL. Bottom very rough; current swift, rough and crooked. Control is a rocky riffle or shoal which heads 10 feet below gage; probably

Extremes of Discharge. Maximum stage recorded, 4.5 feet at 7 a.m. December 14, 1920 (discharge, 9,800 second-feet); minimum stage recorded, 1.58 feet at 7 a.m. November 14, 1920 (discharge, 195 second-feet).

ICE. Stage-discharge relation seldom if ever affected by ice.

REGULATION. None.

Accuracy. Stage-discharge relation permanent. Rating curve well defined between 150 and 3,000 second-feet; extended above. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

Note. October 1 to 31, 1920, filled in by estimates derived from comparative hydrographs using records of Little Tennessee River at Judson and Hiwassee River at Murphy.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF NANTAHALA RIVER AT WESSER. N. C.

	Ye	ar	- 1	Y	eai
Week			Week		
	1920	1921		1920	1921
		506	27	370	
		883	28	307	
			29		
		781	30	606	
		529	0.000	350	
		489	31	286	
	The second secon	1,474	-,	564	
		1,039	33	1,226	
		9,210	34	688	
		652	35	518	
		523	36	441	
		435	37	597	
		466	38	421	
		483	39	370	
		415	40	310	
		375	41	271	
	906	772	42	242	
	899	585	43	272	
	747		44	276	
	685		45	221	
	625		46	430	
	591		47	309	
	483		48	334	
	446		49	462	
	385		50	1,564	
	503		51	666	
	365		52	826	

MONTHLY DISCHARGE OF NANTAHALA RIVER AT WESSER, N. C. [Drainage area, 160 square miles]

]				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1920					
April 15-30	1,100	785	895	5.59	3.33
May		460	635	3.97	4.58
June		320	433	2.70	3.01
July		290	400	2.50	2.88
August		260	690	4.31	4.97
September.		320	459	2.87	3.20
October		225	271	1.69	1.95
November	970	205	320	2.00	2.23
December.	6,400	320	842	5.26	6.06
1921	0, 100	320	012	0.20	0.00
January	1,850	460	658	4.11	4.74
February		460	1,000	6 25	6.51
March.	680	390	494	3.09	3.56
April	1,400	355	536	3.35	3.74

NANTAHALA RIVER AT ALMOND, N. C.

LOCATION. At Almond, Swain County, 1,000 feet downstream from railroad station and concrete highway bridge, and one-fourth of a mile above junction of Nantahala and Little Tennessee rivers. It is 300 feet above site of old cable footbridge and 4 miles below mouth of Wesser Creek.

Drainage Area. 177 square miles (measured on topographic maps).

RECORDS AVAILABLE. April 16, 1912 to November 30, 1917; January 31, 1921 to

December 31, 1923.

Vertical staff attached to large blackgum tree on right bank near rear of J. H. Coffey's store; read by Mrs. Coffey. From April 16, 1912 to December 31, 1913, the gage used by Knoxville Power Co., was vertical staff at footbridge 300 feet below present gage. On January 1, 1914, a Friez automatic recorder was installed by the power company several hundred feet farther downstream, and maintained until November 30, 1917. Automatic gage referenced to pre-Datum of present vious staff gage by long series of simultaneous readings. gage independent of that used by the power company.

DISCHARGE MEASUREMENTS. Made from cable footbridge 300 feet below gage, and from concrete bridge 1,000 feet upstream.

CHANNEL AND CONTROL. Channel straight for several hundred feet above and below gage. Bed composed of gravel and boulders; probably permanent. Both banks at gage slope gradually. Control is rocky riffle which breaks sharply 500 feet below gage. There is small possibility of backwater effect from the Little Tennessee River.

Extremes of Discharge. Maximum discharge recorded, 15,400 second-feet at 1:30 p.m. January 21, 1922 (gage height, 7.75 feet); a mean daily discharge of 15,240 second-feet is recorded March 4, 1917; minimum stage, 0.70 foot at

5 p.m. November 29, 1922 (discharge, 115 second-feet). ICE. Stage-discharge relation not affected by ice.

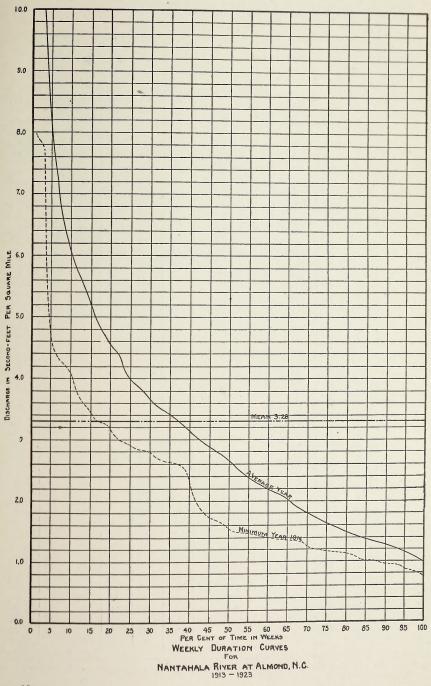
REGULATION. None.

ACCURACY. Stage-discharge relation fairly permanent; rating curve fairly well defined below 3,000 second-feet and extended above. During 1912-13, gage read to hundredths twice daily; during 1921-1923, read to half-tenths twice daily. Daily discharge ascertained by applying to rating table mean daily gage height obtained from two readings on staff or from inspection of recordergraph. Records fairly good.

Cooperation. Records of daily and monthly discharge previous to 1918, furnished

by Knoxville Power Co.

Note. Break in record, December 1, 1917 to January 31, 1921, filled in by estimates derived from comparative discharge hydrographs, using records of Little Tennessee River at Judson and of Hiwassee River at Murphy, except those for April 15, 1920 to January 21, 1921, which were obtained by use of gage relation curve between Wesser and Almond gages.



Mean Weekly Discharge, in Second-feet, of Nantahala River at Almond, N. C.

W. 1					1	Y	ear					
Week	1912	1913	1911	1915	1916	1917	1918	1919	1920	1921	1922	1923
1		416	282	714	817	835	319	1,554	312	411	579	1,911
2		533	263	713	854	649	541	774	466	986	916	563
3 4		487	244	836	763	854	524	683	699	875	3,449	643
5		838 748	260	1,043	877	952	896	1,149	1,963	649	2,460	1,111
6		669	432 520	1,109	1,317	1,176	1,817 774	769 640	946 873	589 1,676	994	1,219
7		779	499	673	555	591	921	780	629	1,131	1,599	1,724
8		539	702	628	491	1,716	979	1,056	741	1,039	975	831
9		894	479	545	543	3,713	633	923	602	737	1,434	769
10		642	465	674	552	2,331	559	1,500	849	583	1,793	936
11		2,138	763	485	427	1,312	513	891	1,180	490	1,636	1,574
12		993	527	415	357	2,584	539	746	1,203	522	1,253	1,207
14		2,047 841	621	445	405	2,029	477	919	1,587	543	1,529	816
15		668	558 581	409	425 445	1,502	556 659	654	3,514 1,371	485	1,244	823 1,049
16	714	532	838	332	352	769	539	811	1,004	853	1,235	874
17	784	439	582	299	321	599	541	547	997	727	995	744
18	722	374	499	276	289	541	536	589	840	594	1,258	673
19	627	359	461	584	245	477	507	727	772	611	1,051	686
20	497	345	363	385	258	405	519	556	709	624	854	1,104
21	415	672	304	345	1,139	422	526	503	673	730	860	1,107
22	554 401	457 457	257	346	500	456	415	422	546	481	788	1,564
24	408	375	297 250	282	438	564	404	346	502	419 357	854 774	961
25	341	339	248	334 267	625 480	485 423	247 411	319 434	426 561	324	584	1,055 721
26	458	306	207	278	408	381	500	917	401	352	475	716
27	446	274	235	518	385	305	321	663	410	259	517	669
28	518	293	209	395	1,615	281	259	486	333	263	458	536
29	471	221	264	291	1,049	439	304	574	678	465	501	503
30	365	259	180	241	932	367	343	447	386	325	467	448
31	402 344	312	168	233	567	349	309	397	311	321	352	410
33	305	305 227	213 201	183 189	639 476	326 300	281 299	345 313	627 1,361	349 412	331 273	526 470
34	313	241	182	225	387	234	265	292	768	422	250	434
35	261	197	196	197	335	377	238	320	590	324	217	361
36	246	192	151	229	312	365	299	221	496	262	205	311
37	277	191	139	215	243	274	229	208	671	225	225	250
38	355	225	170	219	224	304	289	171	471	214	196	248
39 40	490	205	153	188	205	428	280	154	407	359	182	229
41	267 239	183 164	179 166	641	221	287	219	201	336	363	174	189
42	286	213	744	326 421	210 277	245 319	201 220	204 209	294 263	229 202	188 158	171 204
43	239	258	241	394	213	287	606	389	296	191	184	173
44	234	200	202	268	239	337	1,756	251	300	316	144	203
45	271	224	217	240	192	278	486	236	235	249	136	207
46	251	221	318	353	278	282	438	321	475	569	189	160
47	223	199	241	476	285	244	436	215	337	651	168	203
48	220	232	639	317	299	255	546	291	368	912	210	240
49 50	466 305	288	1,401	257	333	258	390	869	522	799	768	458
51	292	240 216	507 469	309	367	283 316	719	1,147	751	476 557	948 1,699	354 398
52	426	321	1,377	1,759 1,133	411 496	309	2,160 1,193	392	925	860	613	564
		,	-,5,,	1,100	200	505	2, 200	002	020	200	010	301

MONTHLY DISCHARGE OF NANTAHALA RIVER AT ALMOND, N. C. [Drainage area, 177 square miles]

		Discharges in	Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1912				-	
April 16-30	1,056	572	750	4.24	2.37
May	1,084	383	570	3.22	3.71
June	711	312	404	2.28	2.54
July	572	317	441	2.49	2.87
August	636	249	337	1.90	2.19
September	1,217	225	335	1.89	2.11
October	436	217	254	1.44	1.66
November.	389	188	241	1.36	1.52
December	767	225	366	2.07	2.39
January	1,350	389	589	3.33	3.84
February	1,509	454	713	4.03	4.20
March	5,058	505	1,380	7.80	8.99
April	1,124	394	629	3.55	3.96
May	1,282	302	446	2.52	2.90
June	621	271	373	2.11	2.35
July	538	205	267	1.51	1.74
August	400	188	256	1.45	1.67 1.27
September	372	170	202 205	1.14	1.34
October	366	150	203	1.17	1.30
November	341 551	179 210	271	1.53	1.76
	5,058	150	462	2.61	35.32
The year	3,008	190		2.01	
January	788	218	278	1.57	1.81
February	913	365	547	3.09	3.22
March	1,441	400	573	3.24	3.74
April	1,214	443	637	3.60	4.02
May	672	250	387	2.19	2.52 1.58
June	400	188	252 218	1.42	1.42
July	495	148	195	1.10	1.27
August	305 201	155 127	155	.870	.97
September October	1.872	136	321	1.81	2.09
November	1,656	173	305	1.72	1.92
December	2,959	400	943	5.33	6.14
The year	2,959	127	401	2.26	30.70
1915					
January	1,438	550	813	4.59	5.29
February	1,674	534	778	4.40	4.58
March	934	386	508	2.87	3.31
April	480	282	364	2.06 2.21	2.55
May	809	260	391	1.69	1.89
June	458	218	299 349	1.09	2.27
July	1,055	209 173	207	1.17	1.35
August	338 429	165	211	1.19	1.33
September	1,393	271	430	2.43	2.80
October	738	227	339	1.92	2.14
November	5,898	241	835	4.72	5.44
DOUGHIOU.			460	2.60	35.25
The year	5,898	165	400	2.00	

MONTHLY DISCHARGE OF NANTAHALA RIVER AT ALMOND, N. C.—Continued

	I	Discharges in	Second-feet			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1916						
January	1,194	626	812	4.59	5.29	
February	2,662	414	766	4.33	4.67	
March.	700	331	459	2.59	2.99	
April	495	305	383	2.16	2.41	
May	3,172	236	495	2.80	3.23	
June	924	358	488	2.76	3.08	
July	2,857	293	947	5.35	6.17	
August	840	318	486	2.75	3.17	
September	352	192	251	1.42	1.58	
October	600	184	234	1.32	1.52	
November	443	180	253	1 43	1.60	
December	810	280	400	2.26	2.61	
The year	3,172	180	498	2.81	38.32	
1917		107				
January	1,739	495	828	4.68	5.40	
February	2,959	534	1,060	5.99	6.24	
March	15,240	1,100	2,610	14.70	16.98	
April	2,112	550	990	5.59	6.24	
May	600	365	451	2.55	2.9	
June	934	338	474	2.68	2.9	
July	748	271	347	1.96	2.20	
August	583	201	297	1.68	1.9	
September	945	241	361	2.04	2.2	
October	558	214	294	1.66	1.9	
November	318 340	226 230	270 281	1.53	1.7	
The year	15,240	201	689	3.89	52.6	
January	3,200	280	783	4.42	5.10	
February	1,500	660	903	5.10	5.3	
March.	620	440	530	2.99	3.4	
April	960	440	568	3.21	3.5	
May	660	440	511	2.89	3.3	
June	580	310	406	2.29	2.5	
July	600	240	320	1.81	2.0	
August	400	210	273	1.54	1.78	
September	370	200	270	1.53	1.7	
October.	5,000	190	559	3.16	3.6	
November		350	538	3.04	3.3	
December	7,800	350	1,070	6.05	6.98	
The year	7,800	190	561	3.17	42.92	

MONTHLY DISCHARGE OF NANTAHALA RIVER AT ALMOND, N. C.—Continued

		Discharges i	n Second-fee	et	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1010					
1919	2 500	200	1 000		2.04
JanuaryFebruary	2,500 1,700	600 580	1,020	5.76	6.64
March	1,900		825	4.66	4.85
April	1,100	640 500	1,010	5.71 3.82	6.58 4.26
May.	1,100	410	676 578	3.27	3.77
June	1,300	300	486	2.75	3.77
July	980	380	535	3.02	3.48
August	470	240	333	1.88	2.17
September	320	145	195	1.10	1.23
October -	800	150	248	1.40	1.61
November	400	210	263	1.49	1.66
December	4,000	270	692	3.91	4.51
The year	4,000	145	572	3.23	43.83
1920					
January	3,200	290	875	4.94	5.70
February	1,600	520	754	4.26	4.59
March	2,600	520	1,100	6.21	7.16
April	8,000	880	1,690	9.55	10.66
May	1,000	520	718	4.06	4.68
June	930	350	483	2.73	3.05
July	1,220	310	442	2.50	2.88
August	2,030	285	770	4.35	5.02
September	1,220	350	513	2.90	3.24
October	520	240	294	1.66	1.91
November	1,070	215	350	1.98	2.21
December	7,500	350	955	5.40	6.23
The year	8,000	215	745	4.21	57.33
1921	9 090	E00	755	4.27	4.92
January	2,030	520	1,130	6.38	6.64
February	4,500	535	549	3.10	3.57
March	770	·432 370	624	3.53	3.94
April	1,660	465	624	3.53	4.07
May	1,000		373	2.11	2.35
June	465	296 235	325	1.84	2.12
July	610	235	373	2.11	2.43
August	610	190	268	1.51	1.68
September	610	190	245	1.38	1.59
October	1,360	226	542	3.06	3.41
November	1,600	400	696	3.93	4.53
The year	4,500	182	542	3.06	41.25

MONTHLY DISCHARGE OF NANTAHALA RIVER AT ALMOND, N. C.-Continued

	Discharges in Second-feet				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1922					
January	12,600	535	1,770	10.00	11.53
February	3,420	815	1,130	6.38	6.64
March.	3,420	950	1,590	8.98	10.35
April	1,730	815	1,120	6.33	7.06
May	1,860	690	972	5.49	6.33
June	1,360	465	698	3.94	4.40
July	690	400	480	2.71	3.12
August	465	2:2	2 83	1.60	1.84
September	340	150	202	1.14	1.27
October	340	132	174	.983	1.13
November	465	132	159	.898	1.00
December	4,800	182	952	5.38	6.20
The year	12,600	132	794	4.49	60.87
1923					
January	2,000	500	841	4.75	5.48
February	3,660	690	1,290	7.29	7.59
March	2,300	690	1,090	6.16	7.10
April		690	863	4.88 5.71	5.44 6.58
May	2,300 1,600	610	1,010	5.71	5.78
June	860	610 370	916 533	3.01	3.47
JulyAugust	730	334	449	2.54	2.93
September	370	212	271	1.53	1.71
October -	302	155	185	1.05	1.71
November	376	146	202	1.14	1.27
December	950	208	434	2.45	2.82
The year	3,660	146	674	3.81	51.38

OCONALUFTY RIVER AT CHEROKEE, N. C.

LOCATION. At cable footbridge one-fourth mile upstream from Cherokee Indian School in Cherokee Indian Reservation, one-fourth mile downstream from small milldam, three-fourths mile upstream from Cherokee, Swain County, 2 miles upstream from mouth of Soco Creek and 7 miles upstream from junction of Oconalufty and Tuckasegee rivers at Elo, N. C.

Drainage Area. 133 square miles (measured on topographic maps).

RECORDS AVAILABLE. January 27, 1921 to December 31, 1923. The gaging station operated on this river, 1907-1908, was located just below mouth of Soco Creek, 2 miles downstream from present gage.

GAGE. A vertical staff with standard enamel face reading from 3.4 to 10.2 feet, attached to a large maple on right bank 6 feet below bridge; read by Mr. J. L.

Walters.

DISCHARGE MEASUREMENTS. Made from cable footbridge just above gage.

CHANNEL AND CONTROL. Channel straight for several hundred feet above and below gage. Both banks steep and about 11 feet high. Wide cultivated bottoms on both banks are overflowed during extreme flood stages. Bed, gravel and small boulders; probably permanent. A rocky riffle 400 feet below forms low water control. 1,000 feet below, the hills shut in to form bluffs on both banks which will control extreme flood stages. Stage-discharge relation considered permanent.

Extremes of Discharge. 1921-1923: Maximum stage recorded during period, 9.5 feet at 1 p.m. January 21, 1922 (discharge 8,990 second-feet); minimum stage recorded, 3.55 feet various days in October and November 1922 (dis-

charge 76 second-feet).

ICE. Stage-discharge relation not affected by ice.

REGULATION. A small dam one-fourth mile upstream, which operates lighting system for Indian School, has very little storage but may cause sufficient diurnal fluctuation during low stages to affect accuracy of daily means.

Accuracy. Stage-discharge relation fairly permanent. Rating curves well defined between 100 and 1,500 second-feet; above that point curve is an extension Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF OCCNALUFTY RIVER NEAR CHEROKEE, N. C.

	Year								
Week	1907	1908	1921	1922	1923				
				286	5				
				347	2				
		412		1,628	3				
		436		1,154	6				
		440	375	476	1,2				
		416	1,297	467	1,0				
		110	829	964	1,0				
		416	632	534	4				
		454	430	1,174	4				
		423	359	1,443					
		442	301	1,172	1,3				
		112	359	669	1,6				
		397	377	1,015					
		406	333	752					
		409	264	527					
		405	706	771					
		414	477	727					
		413	472	1,076					
		341	463	749					
		407	354	585					
		406							
			435	574	1,				
		432	348	436					
		427	273	435					
		410	298	437					
		421	316	335					
		385	266	367					
			· 194	603					
			222	401	;				
			505	387					
			319	335					
			659	243	;				
			522	342	;				
			722	252	- ;				
			613	236					
	249		460	163	- :				
	231		308	153					
	299		243	157	-				
	274		214	116					
			212	110					
	393		289	102					
	278		195	111					
	207		160	103					
	191		146	109	1				
	382		250	87	1				
	477		169	81	1				
			355	106	- 1				
			384	92	- 1				
	439		771	171	. 1				
	313		559	309	3				
	530		298	544	2				
	384		343	868	3				
	390		448	287	4				

Monthly Discharge of Oconalufty River at Cherokee, N. C. [Drainage area, 133 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1921					
January 27-31	415	385	398	2.99	0.56
February	3,030	328	789	5.93	6.18
March	575	250	353	2.65	3.06
April	1,230	250	444	3.34	3.73
May	808	311	427	3.21	3.70
June	445	225	290	2.18	2.43
July	1,030	180	305	2 29	2.64
August	2,300	200	633	4.76	5.49
September	367	180	252	1.89	2.11
October	403	142	195	1.47	1.70
November	940	142	358	2.69	3.00
December.	1,440	250	444	3.34	3.85
1922					
January	6,490	275	818	6,15	7.09
February	2,300	415	613	4.61	4.80
March	3,520	508	1,150	8.65	9.97
April	1,230	415	711	5.35	5.97
May	2,170	415	705	5.30	6.11
June	685	275	406	3.05	3.40
July	1,130	260	419	3.15	2.68
August	475	160	253	1.90	2.19
September	344	92	134	1.01	1.13
October	180	78	105	.789	.93
November	168	78	90.6	.681	.76
December	2,440	118	487	3.66	4.25
The year	6,490	78	491	3.69	49.18
1923	1,670	250	545	4.10	4.73
January	2,300	355	847	6.37	6.65
February	1,790	385	846	6.36	7.35
March.	1,790	385	557	4.19	4.68
April	1,790	445	777	5.84	6.78
	725	344	480	3.61	4.03
June	685	225	337	2.53	2.92
July	540	180	298	2.24	2.58
August September	367	124	159	1.20	1.34
October	131	92	108	.812	.94
November	328	92	137	1.03	1.15
December	808	142	335	2.52	2.90
The year	2,300	92	452	3.40	45 .96

TUCKASEGEE RIVER NEAR EAST LAPORT, N. C.

- Location. At steel highway bridge on road between Sylva, Cullowhee and East Laport, 1 mile west of East Laport, Jackson County, and 1 mile southeast of Cullowhee. Caney Fork enters from the right 1½ miles upstream.
- DRAINAGE AREA. 200 square miles (measured on topographic maps). RECORDS AVAILABLE. May 27, 1907 to December 31, 1909; December 21, 1920 to December 31, 1923.
- GAGE. Chain gage attached to downstream handrail of bridge, read by W. D. Wike. Gage used, 1907-1909, was vertical staff fastened to post on left bank, 75 feet below bridge. Datum unchanged but stage-discharge relation was changed by relocation of gage.
- DISCHARGE MEASUREMENTS. Made from highway bridge at gage.
- CHANNEL AND CONTROL. Channel straight for 500 feet above and below gage.

 Bed composed of rock, sand and gravel; shifts slightly. Right bank high, but during extremely high stages is overflowed beyond end of bridge; left bank extremely high and not subject to overflow. Control is series of solid rock
- riffles several hundred feet downstream; practically permanent.

 Extremes of Discharge. Maximum stage recorded, 9.6 feet February 15, 1908 (discharge, 6,000 second-feet); minimum stage recorded, 0.99 foot November 29 and 30, 1922 (discharge, 103 second-feet).
- ICE. Stage-discharge relation not affected by ice.
- REGULATION. Negligible.
- ACCURACY. Stage-discharge relation not permanent. Rating curves used, fairly well defined for medium and low stages, 1907-1909, and well defined below 1,000 second-feet for recent years; all extended for high water. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records, 1907-1909, fair; 1920-1923, good up to 1,000 secondfeet and fair beyond.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF TUCKASEGEE RIVER NEAR EAST LAPORT, N. C.

	Year								
Week	1907	1908	1909	1920	1921	1922	1923		
1		704	739		579	393	854		
2		1,680	539		777	621	390		
3		783	633		771	1,105	338		
4		566	458		584	1,247	590		
6		661 583	452 729		549	704	664		
7		2,137	1,116		1,063 969	802 1,188	925 891		
8		769	866		1,089	786	514		
9		521	761		671	1,102	531		
10		589	1,064		542	1,088	549		
11		686	1,426		470	1,185	1,162		
12		954	1,177		557	1,014	971		
13		790	1,111		540	1,659	621		
14		571	726		458	1,315	588		
15		664	989		447	934	701		
16		684	697		874	914	665		
17		1,104	747		800	769	579		
18		644	1,137		582	971	555		
19		903	1,273		617	746	634		
20		537	776		624	837 888	862		
21		514	1,596 1,161		857 550	894	1,290 1,864		
22	569 531	576 459	2,411		435	763	1,121		
23	395	499	928		405	621	778		
24 25	406	390	754		331	544	600		
26	448	336	794		436	533	627		
27	376	539	7₹1		286	408	556		
28	357	544	610		296	421	557		
29	336	381	526		450	441	724		
30	288	306	494		332	411	453		
31	271	327	531		318	296	449		
32	266	367	787		287	263	437		
33	296	2,88	599		353	261	428		
34	242	797	385		390	265 197	348		
35	231	471	306		307	186	319		
36	220	362	271		234 230	189	294		
37	195	296	221		212	156	888		
38	504	249 227	980 957		309	177	332		
40	386 296	213	317		422	159	250		
41	238	331	747		175	179	235		
42	220	213	985		165	147	328		
43	220	404	531		151	142	236		
44	275	455	380		293	129	436		
45	233	288	296		213	129	358		
46	262	301	235		405	137	267		
47	766	288	191		424	125	267 387		
48	407	292	171		396	120	604		
49	239	761	429		461	238 320	571		
50	907	501	1,029		308 585	1,111	534		
51	765	484	731	054	632	462	461		
52	924	551	523	951	002	102	20.		

Monthly Discharge of Tuckasegee River Near East Laport, N. C. [Drainage area, 200 square miles]

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907					
June	1,050	335	477	2.38	2.66
July	480	275	340	1.70	1.96
August	335	220	258	1.29	1.49
September	2,380	170	322	1.61	1.80
October	305	220	241	1.20	1.38
November	1,230	195	410	2.05	2.29
December	2,380	220	691	3.46	3.99
1908 January	4,450	520	893	4.46	5.14
February	8,000	480	1,020	5.10	5.50
March	1,710	480	724	3.62	4.17
April	3,780	480	750	3.75	4.18
May	1,950	480	648	3.24	3.74
June	640	305	429	2.14	2.39
July	740	245	432	2.16	2.49
August	1,360	275	464	2.32	2.68
September	440	220	287	1.44	1.61
October	890	195	320	1.60	1.84
November	370	275	298	1.49	1.66
December	2,380	305	557	2.78	3.20
The year	8,000	195	569	2.84	38.60
1909	1,570	405	576	2.88	3.32
JanuaryFebruary	3,350	440	824	4.12	4.29
March	2,850	690	1,150	5.75	6.63
April	2,380	600	793	3.96	4.42
May	3,050	690	1,200	6.00	6.92
June	5,700	644	1,200	6.15	6.86
July	910	419	594	2.97	3.42
	1,560	305	542	2.71	3 12
August September	3,350	208	585	2.71	3.12
October	1,950	239	622	3.11	3.58
November	379	179	246	1.23	1.37
December	3,350	152	639	3.20	3.69
December 1	0,000	192		0.20	0.09
The year	5,700	152	751	3.75	50.88

MONTHLY DISCHARGE OF TUCKASEGEE RIVER NEAR EAST LAPORT, N. C.—Continued

	1	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1920					
December 21-31	1,860	488	894	4.47	1.83
1921					
January	1,150	488	669	3.34	3.85
February	2,370	488	933	4.66	4.85
March	800	420	536	2.68	3.09
April	1,570	360	648	3.24	3.62
May	1,200	465	660	3.30	3.80
June	750	300	413	2.06	2.30
July	700	248	340	1.70	1.96
August	750	230	337	1.68	1.94
September	442	175	249	1.24	1.3
October	750	155	235	1.18	1.36
November	1,000	165	344	1.72	1.9
December	1,320	265	493	2.46	2.8
The year	2,370	155	488	2.44	32.9
1922					
January	3,150	360	827	4.14	4.7
February	2,380	644	870	4.35	4.5
March	2,950	746	1,250	6.25	7.2
April	2,470	694	990	4.95	5.5
May	1,710	620	853	4.26	4.9
June	1,560	419	664	3.32	
July	549	323	418	2.09	2.4
August	596	179	255	1.28	1.4
September	305	132	178	.890	.8
October	305	127	154	.770	.7
November	168	103	127	.635	2.9
December	4,220	134	506	2.53	2.8
The Year	4,220	103	591	2.96	40.0
1923	2.000	20"	555	2.78	3.2
January	2,380	305	742	3.71	3.8
February	1,710	461	790	3.95	4.5
March	2,200	461	627	3.14	3.5
April	1,270	504	1,030	5.15	5.9
May	3,050	461	843	4.22	4.7
June	1,480	549	563	2.82	3.2
July	1,710	360	402	2.01	2.3
August	620	288	402	2.23	2.4
September	3,890	239		1.30	1.5
October	461	157	260 352	1.76	1.9
November	1,480	208		2.64	3.0
December	1,140	341	528	2.04	
The year.	3,890	157	595	2.98	40.3

TUCKASEGEE RIVER AT BRYSON, N. C.

LOCATION. At highway bridge in Bryson, Swain County, on the main street between Southern Railway station and county courthouse, half a mile below mouth of Deep Creek, 5½ miles below mouth of Oconalufty River and 15 miles above junction of Tuckasegee and Little Tennessee rivers.

Drainage Area. 673 square miles (measured by Knoxville Power Company on

topographic maps).
RECORDS AVAILABLE. November 7, 1897 to December 31, 1923.

Gage. A vertical rod attached to first pier from left bank; read by employees of Knoxville Power Company. From February 3, 1914 to May 17, 1920, the gage was a Friez water-stage recorder, located on right bank 200 feet below bridge. Prior to February 3, 1919, the gage was a staff attached to right bank pier of old steel bridge. Datum of present gage and Friez recorded 0.1 foot higher than original gage.

DISCHARGE MEASUREMENTS. Made from downstream side of bridge to which

gage is attached.

CHANNEL AND CONTROL. Bed at gage is sand, gravel and boulders; fairly permanent. Both banks are high and not subject to overflow beyond ends of bridge. Control is a rock, gravel and sand riffle half a mile downstream; practically permanent.

Extremes of Discharge. 1898-1923: Maximum stage recorded, 11.0 feet (old Geological Survey gage), March 19, 1899 (discharge 38,600 second-feet); minimum discharge recorded, 300 second-feet several days in September, 22-30, 1899.

ICE. Stage-discharge relation seldom, if ever, affected by ice.

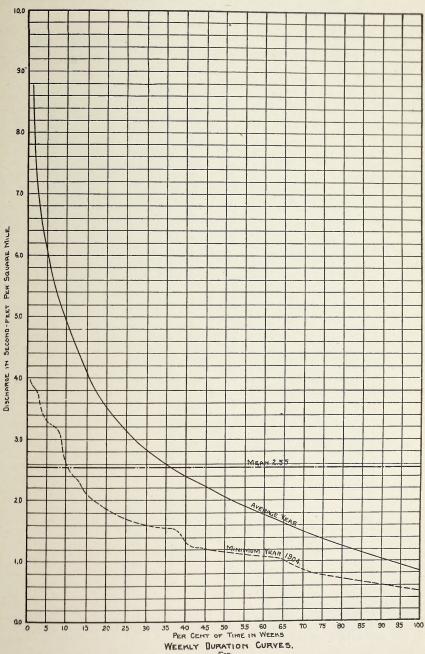
REGULATION. Slight diurnal fluctuations caused by small plants upstream, during low stages; probably not enough to affect accuracy of records during periods

when record is based on two daily rod readings.

Accuracy. Stage-discharge relation fairly permanent. Rating curves for recent years very well defined except at extremities; for former years not so good; for 1898 and 1899, poorly defined. Gage read to hundredths twice daily since recorder was taken out. Probably first gage was read only once a day. Daily discharge ascertained by applying mean daily gage height to rating table. Records poor for 1898 and 1899; fair to good for 1900 to 1915; and good since 1915 except for extremely high water which are fair.

Cooperation. Daily discharge record October 1, 1915 to December 31, 1919, and mean daily gage heights January 1, 1920 to December 31, 1923, furnished by Knoxville Power Co.

Short breaks in the record have been filled in by estimate derived from comparative hydrographs of gaging stations near by.



TUCKASEEGEE RIVER AT BRYSON, N.C.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET

		Year										
Week	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909
	con	0.000		1 000	0.001	1 017	400		2 465	0.214	0.424	0.17
1	623	2,356	820	1,286	2,901	1,617	496	803	3,467	2,314	2,434	2,17
3	1,197	2,474	2,429	4,483	1,779	1,397	539	3,072	1,719	1,614	3,227	1,54
1	2,096	1,740	2,217	1,871	1,413	1,070	724	1,247	1,731	1,449	2,194	2,43
5	4,036	1,501	2,580	1,399	1,547	1,043	2,178	803	4,567	1,270	1,614	1,38
6	1,339 889	5,584	1,969	1,714	4,360 $2,070$	1,274 409	620 1,040	3,072 1,247	2,021 1,449	1,737	1,551	1,13 2,52
7	754	13,086	1,714	1,904						2,039	1,557	
8		3,043	7,223	1,491	1,559	4,959	750	803	1,270	1,290	4,826	3,18
9	754	2,257	3,853	1,074	1,769	2,726	1,609	760	1,254	1,240	2,440	3,88
	649	6,229	2,594	977	6,774	5,154	1,266	2,361	1,813	2,596	2,192	2,81
) 1	569	3,967	4,557	2,186	3,543	4,663	2,564	2,260	1,481	2,239	2,341	3,4
2	984	11,583	3,291	1,443	4,281	3,593	1,360	3,550	2,089	1,813	2,339	4,63
3	916	13,297	4,110	2,679	2,744	6,399	2,534	1,744	2,233	1,311	3,999	3, 18
	6,346	5,714	2,141	5,076	5,121	4,579	2,093	2,731	3,019	1,210	2,864	3,8
4	2,621	4,107	2,064	5,270	2,961	4,774	1,636	1,747	2,029	1,363	1,834	2,3
5	2,111	, 3,883	2,207	2,801	2,240	5,041	1,410	1,844	2,871	1,160	1,593	2,3
3	1,639	2,613	3,401	3,620	1,990	3,814	1,150	1,280	2,301	1,540	1,961	1,7
7	1,911	2,943	2,810	3,017	1,649	2,647	1,259	1,201	1,557	1,834	3,384	1,8
8	1,327	2,507	2,041	2,214	1,661	1,967	1,043	1,611	1,603	1,853	2,069	4,0
9	1,153	2,819	1,620	1,731	1,341	1,580	2,170	1,180	1,336	2,326	2,247	2,5
0	1,096	1,871	1,230	1,766	1,334	1,341	1,091	1,189	1,041	1,596	2,067	2,3
1	913	1,429	1,221	6,431	1,376	1,180	830	1,420	1,026	1,451	1,846	4,2
2	711	1,206	997	2,857	1,131	1,964	1,107	1,557	1,511	1,863	1,719	2,7
3	547	1,020	1,596	2,141	913	2,670	1,057	1,971	1,253	1,761	1,379	5,3
4	714	2,259	2,241	2,360	865	1,533	766	1,864	2,679	1,343	1,377	2,8
5	740	1,029	3,946	2,046	896	1,190	77,7	1,354	1,644	1,224	1,070	2,20
6	590	893	3,266	1,924	1,023	1,053	916	989	1,434	1,781	976	2,3
7,	724	897	1,971	1,866	798	996	691	944	1,554	1,164	1,593	2,8
8	1,380	679	1,616	1,064	923	1,186	735	1,301	1,567	1,276	1,486	3,13
9	914	599	1,526	1,157	667	911	662	1,231	2,846	1,327	1,030	1,7
00	1,370	950	1,714	863	569	771	729	1,066	1,999	881	880	1,9
1	5,721	689	1,099	815	536	886	1,191	3,459	1,946	766	766	2,1
2	4,771	583	837	3,624	531	701	80'0	1,779	1,393	874	1,293	1,8
3	2,900	569	816	6,933	471	776	819	1,261	1,720	926	814	2,4
1	1,604	450	921	4,766	431	597	796	933	1,754	856	1,831	1,3
5	1,736	623	871	2,771	489	536	716	2,211	2,773	639	1,049	1,1
3	10,279	509	683	2,037	882	523	557	1,819	2,496	734	1,101	9
7	1,920	450	1,259	1,777	702	579	441	1,324	1,494	730	726	1,0
8	2,714	374	902	2,341	1,550	489	425	980	3,859	1,430	624	1,5
)	1,660	300	675	1,330	1,020	420	729	827	4,160	1,326	583	1,1
0	7,581	365	624	1,140	736	395	410	729	5,827	1,001	522	8:
1	3,079	764	618	1,250	735	516	370	610	2,767	766	769	1,10
2	4,379	543	549	951	639	481	360	597	2,281	631	522	1,1
3	2,036	425	2,180	820	515	405	346	660	1,559	671	831	8
4	1,409	591	995	804	515	436	373	529	1,290	947	1,187	. 78
5	1,521	412	807	734	981	494	409	535	1,191	1,027	683	7
6		365	689	681	630	7.00	449	479	2,167	946	783	7
7	1,587					1,355	435	544			681	73
	2,157	578	1,091	701	1,148	511			5,991	2,493		
3	1,759	679	2,121	639	1,221	390	484	573	1,756	1,417	811	1 9
9	1,907	586	1,993	899	1,744	405	1,090	2,964	1,563	1,167	2,369	1,20
0	1,073	2,764	960	4,960	1,771	477	545	1,554	1,687	2,011	1,531	1,83
1	1,430	836	1,331	1,904	2,109	615	448	1,531	2,383	1,886	1,559	1,04
2	2,754	1,130	1,430	5,812	1,281	606	1,066	1,490	2,649	2,912	1,934	8

OF TUCKASEGEE RIVER AT BRYSON, N. C.

14.5	× .						Year							
1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	Week
1,610	4.353	2,117	1,353	1,023	2,371	3,162	2,929	936	4,120	984	1,549	1,184	2,320	1
1,541	1,451	1,461	1,674	846	2,533	2,919	1,933	2,316	2,016	1,377	2,507	1,711	1,304	2
1,399	1,110	1,274	1,479	789	3,279	2,764	2,559	1,079	1,873	1,689	2,307	4,593	1,242	3
1,323	1,013	1,060	2,714	839	3,313	2,448	2,930	3,005	7,709	3,547	4,704	4,073	2,356	4
1,063	1,229	3,046	2,543	1,412	3,865	3,942	2,876	4,754	2,101	2,459	1,660	2,093	3,069	5
2,124	2,363	1,351	1,906	1,734	2,866	2,766	1,761	2,103	1,716	1,951	3,953	2,166	3,310	6
1,681	1,720	1,411	2,061	1,323	2,236	1,978	1,744	2,680	1,993	1,606	2,956	3,663	3,304	7
1,913	1,499	2,610	1,583	1,880	2,144	1,658	4,026	2,666	2,523	1,759	2,919	2,396	1,903	8
2,994	1,250	3,556	3,833	1,350	1,732	1,849	7,170	1,796	2,419	1,605	2,069	3,790	1,769	9
1,837	2,264	2,433	1,803	1,176	2,097	2,141	5,329	1,633	3,478	1,624	1,681	4,321		10
1,356 1,180	1,387 1,353	4,550	5,983	1,889	1,500 1,329	1,721 1,566	3,541 4,337	1,350 1,571	2,642 2,053	3,809	1,486 1,634	4,233 2,969	3,794	11
984	1,961	3,374 5,220	3,166 7,244	1,430 1,936	1,297	1,688	4,828	1,378	2,085	4,014	1,619	3,989	2,151	
906	5,189	3,999	2,757	1,796	1,243	1,689	3,478	2,252	1,641	9, 1,80	1,461	3,323		14
907	3,909	2,354	2,593	1,997	1,617	1,639	3,009	1,537	1,884	3,797	1,356	2,541		15
2,146	3,197	2,454	2,203	2,247	1,152	1,317	2,299	1,434	2,249	3,551	2,744	2,766		16
1,110	2,164	3,514	1,637	1,619	1,139	1,197	1,957	1,372	1,559	3,191	2,063	2,641	1,957	
1,034	2,060	3,321	1,384	1,360	1,013	1,030	1,839	1,367	2,299	2,274	1,741	3,197	1,947	18
2,686	1,480	2,790	1,291	1,221	2,083	936	1,617	1,404	1,622	2,211	1,289	2,711	2,004	19
1,897	1,260	2,021	1,190	1,031	1,326	912	1,406	1,378	1,420	1,859	1,684	2,469	2,966	20
3,030	1,200	1,479	2,777	868	1,165	2,317	1,314	1,416	1,450	1,463	2,096	2,396	3,703	
1,973	1,014	2,124	1,861	727	1,502	1,605	1,267	1,073	1,258	1,311	1,507	2,081		22
2,587	863	1,651	1,736	803	1,197	1,619	1,474	1,214	1,038	1,624	1,366	2,010	,	23
2,224	734	1,401	1,251	672	1,187	2,366	1,357	888	994	1,061	1,329	1,884	2,587	
1,820	806	1,140	1,130	843	967	1,750	1,213	1,659	1,281	1,599	1,259	1,545	1,724	
1,534	881	1,919	994	602	1,732	1,509	1,142	1,151	1,872	1,101	945	1,409		
2,059	734	1,947	966	691	2,024	1,418	1,025	901	1,159	1,034	1,134	1,676	1,520 1,321	28
2,290	1,104	2,066	973	629	1,507	4,539	916	787 709	1,102	926 1,297	1,903 1,249	1,483	1,443	
2,019	979	1,871	760	849	1,229	4,057	1,624	921	1,285	983	1,657	1,419	1,241	
1,509	893 1,023	1,424	1,002	570 507	1,061	2,972 2,297	1,569 1,284	791	1,120	784	1,323	1,030	1,271	31
1,610 1,250	839	1,614 1,337	1,039 1,033	579	796	2,074	1,052	750	1,320	1,729	2,006	1,011	1,530	
1,006	733	1,191	902	719	929	1,800	965	857	1,241	3,250	1,683	964	1,281	
1,053	542	996	891	504	1,060	1,383	. 800	702	2,339	974	987	769	1,231	
1,467	834	849	694	577	771	1,218	1,241	1,164	1,723	937	1,313	735	936	35
1,293	748	765	685	409	1,056	1,154	1,142	1,042	1,686	830	983	569	793	
1,031	619	767	647	390	827	1,134	801	810	1,834	802	829	682	733	
765	640	1,293	1,006	494	779	926	800	827	1,293	752	917	572	885	1
867	704	1,214	719	414	699	842	1,202	647	759	1,081	1,036	641		39
883	585	822	606	520	2,428	681	831	576	748	908	693	511	557 465	40
1,071	897	729	546	394	1,171	680	826	713	946	757	634	673	544	42
839	1,822	898	676	2,363	1,438	1,155	1,141	1,220	1,046	721	607 879	558 564	496	
646	834	726	1,308	737	1,193	771	881	3,812	1,739 1,038	814 726	750	474	634	
617	627	727	782	573	931	782	948	4,586 1,239	1,038	685	1,411	471	745	
610	1,073	1,019	790		825	647	746 727	1,239	1,323	1,247	1,399	572	540	1
555		689	959	872	1,146	834 896	653	1,463	837	1,077	2,047	444		1
535	1,121	653		598	1,912	1,066	639	1,668		1,232	1,739	501	837	1
654	915	636			1,314 1,045	1,132	589	1,189	1000	1,300	1,739			
1,540	774	1,637	1	3,283	1,045	1,117	626	1,688		3,644	1,133		1,118	
793 714	834 1,506	853 814			4,759	1,116	824	4,179			1,493	3,133		
1,456		1,214			3,705	2,149	704	2,852		2,270	1,604	1,551	1,289	52
1, 100	0,201	1,211	2,200	2,000	,							1	1	-

Monthly Discharge of Tuckasegee River at Bryson, N. C. [Drainage area, 673 square miles]

	Ι	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1897					
November 7-30	640	300	349	0.519	0.46
December	4,850	370	973	1.45	1.67
1898	1,000	310	310	1.10	
January	9,100	450	1,950	2.90	3.34
February	1.220	590	827	1.23	1.28
March	18,000	540	1,950	2.90	3.34
April	3,950	1,370	2,110	3.14	3.50
May	1,450	750	1,060	1.58	1.82
June	1,290	495	649	.964	1.08
July	5,200	540	1,120	1.66	1.91
August	22,800	1,070	3,500	5.20	6.00
September	26,300	1,000	4,050	6.02	6.72
October	21,900	1,000	4,000	5.94	6.85
November	2,400	1,140	1,700	2.53	2.82
December	3,400	870	1,820	2.70	3.11
The year	26,300	450	2,061	3.06	41.77
1899					
January	3,650	1,140	1,950	2.90	3.34
February	28,800	1,220	6,900	10.25	10.68
March	38,600	1,900	8,110	12.05	13 .89 5 .63
April May May	5,550 3,650	2,200 1,140	3,400	5.05 3.02	3.48
June	5,200	750	2,030	1.95	2.18
July	1,450	540	1,310 782	1.16	1.34
August	750	450	564	838	.97
September	640	300	424	.630	.70
October -	1,500	365	510	.758	.87
November	1,210	365	524	.779	87
December	11,500	515	1,290	1 92	2.21
The week	20 600	300	0.210	3.44	46.16
The year	38,600	300	2,316	3.44	40.10
January	3,510	820	2,030	3.02	3.48
February	15,100	940	3,770	5.60	5.83
March	11,500	1,820	3,430	5.10	5.88
April	5,520	1,820	2,590	3.85	4.30
May	2,160	820	1,420	2.11	2.43
June	6,440	940	2,600	3.86	4.31
July		1,070	1,710	2.54	2.93
August	1,500	660	881	1.31	1.51
September	3,300	562	880	1.31	1.46
October	8,600	515	974	1.45	1.67
November	7,640	562	1,190	1.77	1.98
December	4,150	820	1,390	2.07	2.39
The year	15,100	515	1,905	2.83	38.17
	1				

MONTHLY DISCHARGE OF TUCKASEGEE RIVER AT BRYSON, N. C.—Continued

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1901					
January	13,200	1,000	2,170	3.22	3.71
February	3,510	940	1,500	2.23	2.32
March	12,400	940	2,610	3.88	4.47
April	9,560	2,160	3,610	5.36	5.98
May	15,800	1,350	3,070	4.56	5.26
June	3,510	1,660	2,170	3.22	3.59
July	2,710	820	1,220	1.81	2.09
August	12,900	710	4,250	6.32	7.29
September	5,290	1,280	1,940	2.88	3.21
October	2,520	820	1,020	1.52	1.75
November	940	610	798	1.05	1.17
December	19,900	610	3,290	4.89	5.64
The year	19,900	610	2,296	3.41	46.48
January	5,290	1,140	2,100	3.12	3.60
February	19,900	1,350	2,930	4.35	4.53
March	11,000	2,160	4,140	6.15	7.09
April	3,720	1,500	2,250	3.34	3.73
May	1,990	1,070	1,370	2.04	2.35
June	1,500	710	951	1.41	1.57
July	1,280	515	734	1.09	1.26
August	820	365	493	.733	.85
September	5,750	400	996	1.48	1.65
October	1,280	515	643	.955	1.10
November	4,370	515	917	1.36	1.52
December	5,750	940	1,680	2.50	2.88
The year	19,900	365	1,600	2.38	32.13
January	2,520	940	1,280	1.90	2.19
February	14,800	1,070	4,110	6.11	6.36
March	15,800	2,340	4,760	7.07	8.15
April	11,700	2,160	4,010	5.96	6.65
May	2,080	1,070	1,510	2.24	2.58
June	4,150	940	1,710	2.54	2.83
July	1,580	660	954	1.42	1.64
August	1,210	515	705	1.05	1.21
September	940	400	504	.749	.84
October	1,070	365	446	.663	.76
November	5,750	365	678	1.01	1.13
December	1,350	365	518	.770	.89
The year	15,800	365	1,765	2.62	35.23

MONTHLY DISCHARGE OF TUCKASEGEE RIVER AT BRYSON, N. C.—Continued

]	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1904					
January	9,080	365	955	1.42	1.6
February	3,100	515	1,080	1.60	1.7
March	7,640	820	2,040	3.03	3.4
April	2,710	940	1,360	2.02	2.2
May	5,520	710	1,260	1.87	2.1
June	1,660	660	908	1.35	1.5
July	1,070	515	704	1.05	1.2
August	1,660	610	886	1.32	1.5
September	940	400	554	.823	
October	435	332	368	.547	.6
November	940	332	435	.646	.7
December	3,100	400	777	1.15	1.8
The year	9,080	332	944	1.40	19.1
1905					
January	11,500	610	1,420	2.11	2.4
February	5,750	610	2,360	3.51	3.6
March	5,290	1,210	1,880	2.79	3.5
April	2,250	940	1,300	1.93	2.
May	3,720	1,210	1,680	2.50	2.
June	1,990	820	1,120	1.66	1.3
July	8,600	880	1,810	2.69	3.
August	4,150	880	1,510	2.24	2.
September	1,210	515	693	1.03	1.
October	2,710	515	682	1.01	1.
November	710	475	529	.786	
December	8,600	515	1,790	2.66	3.
The year	11,500	475	1,398	2.08	28.
January	9,320	1,070	2,820	4.19	4.
February	1,990	1.070	1,380	2.05	2.
March	6,210	1,070	2,190	3.25	3.
April	5,290	1,420	2,190	3.25	3.
May	2,340	820	1,280	1.90	2.
June	5,060	940	1,750	2.60	2.
July	4.370	1,070	1,950	2.90	3.
August	4,830	1,070	1,900	2.82	3.
September	11,000	1,210	2,960	4.40	4.
October	7,640	1,350	2,940	4.37	5.
November	20,100	1,070	2,650	3.94	4.
December	5,750	1,350	2,050	3.05	3.
The year	20,100	820	2,172	3.23	43.

MONTHLY DISCHARGE OF TUCKASEGEE RIVER AT BRYSON, N. C.—Continued

		Discharges	in Second-fe	et	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907					
	2 100	1 110	1 000	2 11	
January	3,100 3,300	1,140	1,620	2.41	2.78
March.	3,930	1,140	1,690	2.51	2.61
April.	2,710	1,070	1,810	2.69	3.10
May	3,100	1,070 1,210	1,470	2.18	2.43
June	3,930	1,210	1,770	2.63 2.42	3.03
July	2,430	820	1,630 1,150	1.71	2.70
August	1,350	610	822	1.71	1.97
September	6,210				1.41
October	1,420	515 610	1,020 752	1.52 1.12	1.70 1.29
November	4,370	610	1,460	2.17	2.42
December	6,440	820	1,400	2.17	3.38
The year	6,440	515	1,430	2.12	28.82
1908					
January	7,160	1,350	2,270	3.37	3.88
February	12,000	1,420	2,630	3.91	4.22
March	7,160	1,660	2,860	4.25	4.90
April	7,880	1,350	2,200	3.27	3.65
May	3,930	1,580	2,030	3.02	3.48
June	1,820	820	1,230	1.83	2.04
July	2,080	820	1,210	1.80	2.08
August	3,510	710	1,190	1.77	2.04
September	1,660	515	765	1.14	1.27
October	2,160	515	750	1.11	1.28
November	1,000	610	722	1.07	1.19
December	8,120	765	1,780	2.64	3.04
The year	12,000	515	1,636	2.43	33.07
January	4,370	1,070	1,820	2.70	3.11
	6,920	940	2,880	4 28	4.46
February	7,160	2,160	3,660	5.44	6.27
March	6,920	1,500	2,260	3.36	3.75
April	7,160	1,500	3,080	4.58	5.28
May	11,700	1,990	3,200	4.75	5.30
June	5,290	1,500	2,370	3.52	4.06
July	4,830	1,070	1,860	2.76	3.18
August	3,930	820	1,160	1.72	1.92
September	2,080	710	991	1.47	1.70
November	880	660	722	1.07	1.19
December.	4,370	610	1,190	1.77	2.04
The year	11,700	610	2,099	3.12	42.26

DISCHARGE RECORDS OF

MONTHLY DISCHARGE OF TUCKASEGEE RIVER AT BRYSON, N. C .- Continued

	1	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
	3				
1910					
January	4,150	1,070	1,430	2.12	2.44
February	4,830	880	1,550	2.30	2.40
March	5,290	940	1,640	2.44	2.81
April	5,290	820	1,250	1.86	2.08
May	4,830	940	2,190	3.25	3.75
June	3,930	1,420	2,030	3.02	3.37
July	3,510	1,210	1,950	2.90	3.34
August	2,900	820	1,200	1.78	2.05
September	1,990	710	1,020	1.52	1.70
October	1,580	610	805	1.20	1.38
November	1,000	515	596	.886	.99
December	4,370	515	1,100	1.63	1.88
The year	5,290	515	1,397	2.08	28.19
1911	0.000	010	1 010	0.04	0.01
January	9,320	940	1,910	2.84	3.27
February	3,510	940	1,700	2.53	2.64
March	3,100	1,140	1,690	2.51	2.89
April	12,700	1,350	3,520	5.23	5.84
May	2,340	940	1,390	2.07	2.39
June	1,900	660	847	1.26	1.41
July	1,420	610	899	1.34	1.54
August	1,660	515	807		
September	1,280	515 515	685	1.02	1.14
October	4,830	610	997	1.48	
November	1,900 6,210	710	1,030 1,580	1.53 2.35	1.71 2.71
The year	12,700	515	1,421	2.11	28.63
1912	=====				======
January	6,210	1,000	1,780	2.64	3.04
February	6,680	1,140	2,210	3.28	3.54
March	11,500	2,160	3,650	5.42	6.25
April	5,750	1,990	3,210	4.77	5.32
May	4,150	1,350	2,340	3.48	4.01
June	3,930	1,070	1,540	2.29	2.56
July	3,300	1,070	1,770	2.63	3.03
August	2,340	820	1,230	1.83	2.11
September	4,600	660	994	1.48	1.65
October	1,210	660	792	1.18	1.36
November	1,420	562	744	1.11	1.24
December	3,100	610	1,110	1.65	1.90
The year	11,500	562	1,781	2.65	36.01

MONTHLY DISCHARGE OF TUCKASEGEE RIVER AT BRYSON, N. C .- Continued

		t			
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1913	4 000		4 000		
January	4,830	1,070	1,860	2.76	3,18
February	9,560 18,400	1,350	2,350	3.49	3.63
March.	3,720	1,500 1,500	4,300 2,320	6.39 3.45	7.37 3.85
April	5,520	1,070	1,720	2.56	
May	2,340	940			2.95
June	1.660	660	1,320	1.96	2.19 1.59
July	1,350	610	929	1.38	
August	1,660			2 2 2 2	1.59
September		534	755	1.12	1.25
October	2,250	515	793	1.18	1.36
November	1,270	599 647	764	1.14	1.27
December	1,900	041	980	1.40	1.68
The year	18,400	515	1,585	2.36	31.91
1914	2,810	699	934	1.39	1.60
JanuaryFebruary	2,610	1,060	1,580	2.35	2.45
	3,030	1,120	1,540	2.29	2.64
March	3,400	1,350	1,910	2.84	3.17
April	1,780	744	1,070	1.59	1.83
May	1,330	512	731	1.09	1.22
June	1,440	481	668	.993	1.14
July	1,000	460	589	.875	1.01
August	657	325	429	.637	.71
September	5,280	346	999	1.48	1.71
October		501	866	1.29	1.44
November	6,570			4.15	4.78
December	7,250	1,320	2,790	4.10	4.70
The year	7,250	325	1,176	1.75	23.70
January	4,600	1,600	2,810	4.18	4.82
February	6,550	1,670	2,730	4.06	4.23
March.	2,660	1,230	1,580	2.35	2.71
April	2,050	1.040	1,280	1.90	2.12
	3,240	902	1,390	2.07	2.39
May	3,240	814	1,290	1.92	2.14
June	2,720	826	1,410	2.10	2.42
July	1,560	721	917	1.36	1.57
August	1,900	595	830	1.23	1.37
September	4,340	940	1,500	2.23	2.57
October	4,085	790	1,260	1.87	2.09
November	13,130	940	2,590	3.85	4.44
	13,130	595	1,632	2.42	32.87

MONTHLY DISCHARGE OF TUCKASEGEE RIVER AT BRYSON, N. C.-Continued

		Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1916	**		-		
January	3,810	2,050	2,760	4.10	4.73
February	7,110	1,540	2,490	3.70	3.99
March	2,620	1,440	1,830	2.72	3.14
April	2,010	1,190	1,540	2.29	1.96
May	5,620	839	1,680	2.50	1.67
June	3,100	1,210	1,780	2.64	2.94
July	7,140	1,190	3,130	4.65	5.36
August	2,910	1,200	1,770	2.63	3.03
September	1,560	678	1,020	1.52	1.70
October	2,380	647	830	1.23	1.42
November	1,400	616	820	1.22	1.36
December	4,935	966	1,388	2.06	2.38
The year	7,140	616	1,753	2.60	33.68
1917					
January		1,350	2,750	3.82	4.40
February	6,380	1,330	2,630	3.91	4.07
March	23,200	3,050	5,320	7.90	9.11
April		1,790	2,680	3.98	4.44
May	2,090	1,180	1,500	2.23	2.5
June	2,470	1,000	1,300	1.93	2.15
July	2,470	802	1,270	1.89	2.18
August	1,660	657	985	1.46	1.68
September	2,840	721	1,070	1.59	1.7
October	1,927	742	934	1.39	1.60
November	914	595	715	1.06	1.18
December	. 889	520	686	1.02	1.18
The year	23,200	520	1,805	2.68	36.38
January	11,330	625	2,299	3.42	3.94
February	4,170	1,790	2,553	3.79	3.95
March		1,227	1,513	2.25	2.59
April	2,793	1,070	1,638	2.43	2.71
May	1,750	1,044	1,367	2.03	2.34
June	3,915	720	1,204	1.79	2.00
July	1,070	647	844	1.25	1.44
August	1,150	570	750	1.11	1.28
September		575	820	1.22	1.36
October	11,330	522	2,122	3.15	3.6
November	3,235	904	1,721	2.56	2.80
December	14,630	1,070	2,425	3.60	4.18
The year	14,630	522	1,605	2.38	32.2

MONTHLY DISCHARGE OF TUCKASEGEE RIVER AT BRYSON, N. C.—Continued

		Discharges in	n Second-feet	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1919					
January	7,315	1,563	2,643	3.93	4.53
February	3,660	1,549	2, 117	3.15	3.28
March	4,680	1,717	2,553	3.79	4.37
April	2,895	1,494	1,850	2.75	3.07
May	2,895	1,254	1,597	2.37	2.73
June	2,640	940	1,279	1.90	2.12
July	1,820	1,005	1,242	1.85	2.13
August	2,135	863	1.123	1.67	1.92
September	1,031	699	799	1.19	1.33
October	3,490	668	1,110	1.65	1.90
November.	1,896	814	1,060	1.58	1.76
December	6,635	780	1,820	2.70	3.11
The year	7,315	668	1,599	2.38	32 .25
1920		200	4 470	0.40	2.00
January	5,050	890	1,970	2.93	3.38
February	3,110	1,360	1,800	2.67	2.88
March	6,780	1,300	2,970	4.41	5.08
April	22,500	2,420	4,840	7.19	8.02
May	2,590	1,220	1,850	2.75	3.17
June	2,420	1,000	1,350	2.01	2.24
July	1,910	750	1,050	1.56	1.80
August	3,850	750	2,080	3.09	3.56
September	3,660	1,000	1,470	2.18	2.43
October	1,290	654	791	1.18	1.36
November	2,760	654	963	1.43	1.60
December	10,800	935	2,270	3.37	3.88
The year	22,500	654	1,950	2.90	39.40
January	5,050	1,360	1,990	2.96	3.41
February	9,320	1,520	2,930	4.35	4:53
March.	2,250	1,360	1,630	2.42	2.79
April	5,050	1,220	1,900	2.82	3.15
May	2,760	1,440	1,810	2.69	3.10
June	2,080	1,000	1,290	1.92	2.14
	3,470	870	1,290	1.92	2.21
July	3,470	870	1,610	2.39	2.76
August	1,440	726	966	1.44	1.61
September	1,290	597	742	1.10	1.27
October		654	1,290	1.92	2.14
November	3,470 2,930	1,000	1,540	2.29	2.64
December	2,950				01 ==
The year	9,320	597	1,582	2.35	31.75

MONTHLY DISCHARGE OF TUCKASEGEE RIVER AT BRYSON, N. C .- Continued

		Discharges i	n Second-fee	t		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1922						
January	14,200	1,140	2,810	4.18	4.82	
February	7,690	1,910	2,610	3.88	4.04	
March	9,080	2,250	3,990	5.93	6.84	
April	4,240	2,250	2,860	4.25	4.74	
May	5,050	1,910	2,610	3.88	4.47	
June	2,590	1,220	1,760	2.62	2.92	
July	2,080	1,070	1,510	2.24	2.58	
August	1,140	678	905	1.34	1.54	
September	935	509	619	0.92	1.03	
October	935	410	569	0.845	0.97	
November	750	360	482	0.716	0.80	
December	9,080	542	1,720	2.56	2.95	
The year	14,200	360	1,870	2.78	37.70	
January	4,850	1,030	1,930	2.87	3.31	
February	6,340	1,600	2,780	4.13	4.30	
March	6,120	1,600	2,750	4.09	4.72	
April	4,250	1,680	2,190	3.25	3.68	
May	5,260	1,680	2,850	4.23	4.88	
June	3,870	1,680	2,260	3.36	3.78	
July	1,990	1,100	1,380	2.05	2.36	
August	1,910	834	1,280	1.90	2.19	
September	1,760	599	781	1.16	1.29	
October	807	435	523	0.777	0.90	
November	1,460	510	698	1.04	1.16	
December	2,820	716	1,250	1.86	2.14	
The year	6,340	435				

SCOTT'S CREEK NEAR DILLSBORO, N. C.

LOCATION. At the footbridge about 1 mile from Dillsboro, Jackson County, and about 1 mile from the mouth of the creek which is tributary to Tuckasegee

DRAINAGE AREA. Not determined.

RECORDS AVAILABLE. August 26, 1907 to June 30, 1908, when the station was discontinued.

CHANNEL AND CONTROL. Bed fairly permanent; current swift. Control not known. Right bank not subject to overflow; at high stages water surrounds

Extremes of Discharge. Maximum stage recorded, 3.0 feet February 15, 1908 (discharge not determined); minimum stage recorded, 1.6 feet numerous days in September, October, and November, 1907 (discharge, 78 second-feet). Ice. Stage-discharge relation not affected by ice.

REGULATION. None.

ACCURACY. Data insufficient for completion of records. Rating curve approximate. Discharge for breaks in the record was greater than 220 second-feet.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF SCOTT'S CREEK NEAR DILLSBORO, N. C.

	Ye	ar	24-	Yea	ır
Week	1907	1908	Week	1907	1908
,					
1		163	27		
2		168	28		
3		167	29		
4		144	30		
5		133	31		
6		150	32		
7			33		
8		193	34		
9		177	35	79	
10		168	36	115	
11		166	37	87	
12		158	38	79	
13			39	118	
14		196	40	109	
15		173	41	92	
16		157	42	78	
17		156	43	86	
18		164	44	94	
19		164	45	86	
20		162	46	107	
21		169	47	147	
22		150	48	127	
23		127	49	106	
24		137	50	138	
25		119	51	122	
		101	52	141	
26		101	02	111	

CHEOAH RIVER AT MILLSAPS, N. C.

LOCATION. At boat landing at Millsaps, Graham County, 500 feet above mouth of Snowbird Creek.

Drainage Area. Not measured. Records Available. August 24, 1907 to June 30, 1908, when station was discontinued.

GAGE. Vertical staff fastened to large maple tree on right bank, at boat landing.

DISCHARGE MEASUREMENTS. Made by boat at boat landing.

CHANNEL AND CONTROL. Conditions unknown.

EXTREMES OF DISCHARGE. Maximum stage recorded, 6.0 feet February 15, 1908 (discharge not determined); minimum stage, 1.1 feet September 17-20, 1907 (discharge, 40 second-feet).

ICE. Stage-discharge relation not affected by ice.

REGULATION. None.

ACCURACY. Data insufficient. Discharge given is approximate for low and medium stages. High water estimates not attempted.

DAILY DISCHARGE, IN SECOND-FEET, OF CHEOAH RIVER AT MILLSAPS, N. C.

Day	August	September	October	November	December
1907					
1		83	76	68	99
2		76	99		
3		68	83	99	
4		61	76	61	115
5		54	83	68	
6		54	91	68	99
7		83	83	76	
8		61	99	68	118
9		68	91	99	
0		54	83		99
1		115	83		
2		68	91	99	
3		61	83	115	
14		47	91	99	
5		54	68		
6		47	68	99	13
7		40	61	99	
.8		40	68		
9		40	61	99	
20		40	68	115	
1			61	99	. 10
22		99	54	107	
3			61		
24	99	83	68		
25	99	68	61	99	
6	83	76	54		
7	68		99	132	
8	68	- 61	83		
29	68	68	68	99	
30	68	83	61	115	
31	54		68		

Day	April	May	June	Day	April	May	June
			7				
1908							
1			99	17	99		83
2			99	18	99		83
3				19	99		83
4			99	20	99		83
5			99	21			83
6			99	22			83
7			99	23			83
8			99	24			76
9			- 99	25			68
10				26			68
11				27		99	68
12	-		99	28		99	68
13	. 99		99	29		99	68
14			99	30		99	68
15			91	31		99	
16	. 91		91				

CHEOAH RIVER AT JOHNSON, N. C.

LOCATION. At farm of W. O. Williams, 1 mile above footbridge at Johnson, Graham County, 11 miles above mouth of river and 11 miles northwest from Robbinsville. Santeelah Creek enters 2 miles above and Yellow Creek enters 4 miles below. Dam site for development No. 2 of Aluminum Co. of America is 1 mile above gage.

Drainage Area. 175 square miles (measured on topographic maps).

RECORDS AVAILABLE. November 1, 1912 to December 31, 1918, and December 29,

1920 to December 31, 1923.

Gage. Vertical staff fastened to large sycamore tree on right bank 100 feet above house of gage reader, W. O. Williams; installed December 29, 1920. From November 1, 1912 to December 31, 1913, gage was vertical staff fastened to rock on right bank three-fourths of a mile downstream, and from January 1, 1914 to December 31, 1918, gage was vertical staff fastened to fallen white oak tree on right bank half a mile below Williams' house. Datum of present gage independent of that previously used.

DISCHARGE MEASUREMENTS. Made from cable just below footbridge. During 1912-1918, measurements were made at section three-fourths of a mile below Williams' house.

CHANNEL AND CONTROL. Bed composed of practically solid rock. Control is a series of rapids several hundred feet below the gage; practically permanent. Left bank is high.

EXTREMES OF DISCHARGE. Maximum discharge recorded, 11,400 second-feet March 4, 1917 (mean daily stage, 7.25 feet); minimum discharge, 95 second-feet October 16-18 and November 22, 1923 (gage height, 0.86 foot).

ICE. Stage-discharge relation rarely affected by ice.

ACCURACY. Stage-discharge relation changed slightly, affecting lower portion of rating curves which are fairly well defined except at high stages. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records below 3,000 second-feet are good, others fair. Cooperation. Complete records for 1912-1918, furnished by Aluminum Co. of

America.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF CHEOAH RIVER AT JOHNSON, N. C.

					Ye	ear				
Week	1912	1913	1914	1915	1916	1917	1918	1921	1922	1923
		537	282	675	1,028	1,270		574	482	79
		897	275	681	974	787		992	828	54
		727	247	801	801	1,138		799	2,405	58
		1,177	282	1,230	1,139	1,129		583	1,624	1,4
·		868	419	1,557	1,393	1,429		587	818	1,5
		700	547	841	859	726	745	1,644	788	1,5
		822	508	754	618	874	1,283	1,016	1,182	1,5
3		576	755	676	516	1,972	1,202	907	771	7
)		1,552	417	543	570	3,368	632	671	1,490	7
)		814	384	870	658	2,243	650	540	2,191	1,1
		1,879	640	521	480	1,363	554	454	1,680	1,5
3		1,063	474	451	400	1,943	571	492	1,055	1,1
3		1,946	753	488	573	2,228	487	536	1,344	1
ł		809	599	470	533	1,437	554	468	1,060	8
5		631	630	599	535	1,060	522	390	787	1,0
3		544	849	403	457	693	737	1,292	1,121	8
7		452	571	355	406	561	632	754	959	1
3		389	485	307	337	522	602	567	1,386	(
)		350	429	824	288	439	579	547	1,055	7
)		347	319	393	276	353	583	528	708	1,2
l		891	264	346	648	360	704	465	765	, !
2		524	223	369	406	380	479	334	626	1,2
3		454	237	317	377	499	474	339	748	7
1		340	184	294	647	478	361	271	774	9
5		313	185	252	451	407	564	245	535	
6		267	161	271	344	328	463	317	440	5
7		259	168	696	355	281	342	200	643	4
3		324	180	344	968	222	258	246	456	8
9		206	288	279	770	325	280	490	429	4
0		252	149	208	568	311	302	291	418	3
1		280	143	252	397	404	276	364	293	6
2		214	206	195	536	253	244	320	270	6
3		180	194	197	632	255	264	573	284	
1		199	143	237	361	219	289	423	263	4
5 s		155 143	169	207	275 264	407 334	229 284	320 209	223	
6 7		143	146 133	234 186	204	235	284	183	171 284	
8		209	123	241	188	200	280	163	184	
9		169	126	192	207	296	266	261	162	
0		150	168	557	175	208	201	266	156	1
1		138	137	275	184	184	188	156	203	1
2		242	666	253	381	269	248	133	149	
3		331	181	256	219	194	416	120	202	1
4		204	153	197	245	252	1,627	423	134	1
5	233	222	179	193	219	199	421	210	135	i
6	195	263	199	433	316	190	553	647	169	1
7	169	214	171	402	499	173	580	678	152	
8	170	267	322	309	401	209	599	1,169	295	2
9	501	350	991	241	425	199	379	789	943	4
0	267	256	309	325	379	169	596	425	1,036	3
1	285	218	448	1,453	409	194	1,663	515	1,617	3
			1,782	1,622	887	185	867	754		5

Monthly Discharge of Cheoah River at Johnson, N. C. [Drainage area, 175 square miles]

]	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1912					
November	389	143	191	1.09	1.22
December	1,132	171	377	2.15	2.48
1913			======	2.10	2.10
January	2,198	470	843	4.81	5.54
February	4,622	517	892	5.09	5.30
March	4,817	572	1,377	7.86	9.05
April	1,067	433	619	3.54	3.94
May	2,552	282	504	2.88	3.32
June	609	244	358	2.04	2.28
July	727	179	262	1.50	1.72
August	433	148	206	1.18	1.35
September	493	138	167	.95	1.06
October	655	130	217	1.24	1.42
November	437	162	218	1.24	1.39
December	826	194	295	1.68	1.94
The year	4,817	130	496	2.83	38.31
1914					
January	1,007	216	296	1.69	1.94
February	1,185	296	551	3.14	3.27
March	1,100	338	532	3.02	3.50
April	1,336	424	662	3.78	4.21
May	693	226	352	2.01	2.32
June	305	142	196	1.12	1.24
July	467	132	191	1.09	1.25
August	268	128	175	1.00	1.15
September	216	112	133	.76	.84
October	2,455	110	275	1.57	1.81
November	777	142	201	1.14	1.28
December	6,902	210	877	5.00	5.76
The year	6,902	110	370	2.11	28.57
1915					5.48
January	2,040	442	833	4.75	
February	4,758	507	946	5.40	5.62
March	1,806	424	575	3.28	3.78
April	1,018	333	453	2.58	2.89
May	2,072	272	451	2.57	2.96
June	535	204	302	1.72	1.92
July	1,898	186	365	2.08	2.40
August	418	171	221	1.26	1.45
September	676	152	212	1.21	1.35
October	1,136	198	322	1 .84	2.12
November	1,052	178	319	1.82	2.03
December	6,322	219	892	5.09	5.87
The year	6,322	152	491	2.80	37.87

DISCHARGE RECORDS OF

MONTHLY DISCHARGE OF CHEOAH RIVER AT JOHNSON, N. C.-Continued

	1	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1010					
1916	0.740	010	070	F 44	0.05
January	2,746	618 442	953 815	5.44 4.65	6.27 5.01
February	3,352 962	374	548	3.12	3.60
April	676	353	478	2.73	3.04
May	1,362	250	395	2.75	2.60
June	1,041	305	449	2.56	2.86
July	1,041	243	639	3.65	4.21
				2.57	2.97
August September	1,235	250 164	451 225	1.28	1.43
October	1,210	166	225	1.28	1.43
				1.39	2.16
November	1,704 2,531	189 308	339 528	3.01	3.47
The year	3,352	164	505	2.88	39.22
January	2,104	535	1,090	6 21	7.16
February	3,352	535	1,226	6.98	7.26
March	11,400	1,064	2,387	13.62	15.70
April	2,464	507	932	5.32	5.93
May	626	314	410	2.34	2.69
June	786	295	428	2.44	2.72
July	594	204	283	1.62	1.87
August	1,160	166	295	1.68	1.94
September	676	183	285	1.62	1.81
October	693	168	222	1.27	1.46
November	250	166	191	1.09	1.22
December	264	136	192	-1.10	1.27
The year	11,400	136	662	3.77	51.03
1918 February	3,234	650	1,053	6.01	6.25
March.	1,006	436	569	3.25	3.75
April	1,041	396	612	3.49	3.87
May	876	430	598	3.41	3.93
June	1,185	314	460	2.62	2.92
July	497	229	305	1.74	2.01
August	442	181	258	1.74	1.70
September	442	183	260	1.48	1.65
October	5,155	171	507	2.89	3.33
November	1,285	314	572	3.26	3.64
December	5,234	338	850	4.85	5 .59
1920	0,404	338		4.00	9.08
December 29-31	820	702	767	4.38	0.49

MONTHLY DISCHARGE OF CHEOAH RIVER AT JOHNSON, N. C.—Continued

Appett with the section of the section of		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1921		7. 7. 1.			
January	2,270	****			
February	4,170	500	726	4.15	4.7
March	740	530	1,050	6.00	6.2
April.		390	515	2.94	3.3
May	2,550 780	365	722	4.13	4.6
June		340	503	2.87	3.31
	470	221	293	1.67	1.86
July	995	178	310	1.77	2.04
August	1,090	217	411	2.35	2.71
September	530	147	209	1.19	1.33
October	500	108	171	.977	1.13
November	1,510	174	615	3.51	3.92
December	2,130	365	678	3.87	4.46
The year	4,170	108	517	2.95	39.79
	0.470	415	1 000		
January	8,470	415	1,290	7.37	8.50
February	2,410	562	889	5.08	5.29
March	5,870	820	1,620	9.26	10.68
April	1,750	665	1,000	5.71	6.37
May	2,550	530	929	5.31	6.12
June	1,870	390	639	3.65	4.07
July	950	340	475	2.71	3.12
August	630	185	267	1.53	1.76
September	702	141	199	1.14	1.27
October	442	123	173	0.989	1.14
November	320	123	148	0.846	0.94
December	5,090	156	991	5.66	6.52
The year	8,470	123	718	4.10	55.78
1923 January	2,410	442	871	4.98	5.74
February	3,480	595	1,290	7.37	7.68
March	2,270	595	1,100	6.29	7.25
April	2,000	595	851	4.86	5.42
May	2,270	530	969	5.54	6.39
June	1,400	470	731	4.18	4.66
July	740	275	400	2.29	2.64
August	530	207	317	1.81	2.09
September	280	132	174	0.994	1.11
October	193	95	113	0.646	0.74
November	442	98	162	0.926	1.03
December	1,340	159	421	2.41	2.78
The year	3,480	95	617	3.54	47.53

HIWASSEE RIVER NEAR HAYESVILLE, N. C.

Location. At Barnard's bridge, a steel highway bridge on the road from Hayesville to Hiwassee, Ga., 1 mile below the mouth of Shooting Creek and 21/2 miles east of Hayesville, Clay County.

Drainage Area. 190 square miles (measured on topographic map). Records Available. May 20, 1907 to December 31, 1909 and August 16, 1922 to

September 30, 1923, when station was discontinued.

Gage. Standard chain gage attached to downstream lower chord of bridge; read by Mrs. V. A. Barnard. Original gage used to December 31, 1909, was a vertical staff attached to a maple tree on left bank about 200 feet above bridge; same datum.

DISCHARGE MEASUREMENTS. Made from downstream side of bridge until falsework of the construction of a new concrete bridge just above in terfered with the distribution of the current at the measuring section. The construction was discontinued before bridge was completed. Since this interference measure-

ments have been made from a steel highway bridge 1 mile below.

CHANNEL AND CONTROL. Bed of stream is composed largely of rock and some sand; fairly permanent. Channel is straight for 500 feet above and 800 feet below station; current is swift. Both banks are high but left bank may be subject to overflow during extreme floods. Control is a rock riffle about 50 feet below gage; fairly permanent.

Extremes of Discharge. 1907-1909: Maximum stage recorded, 11.0 feet at noon December 17, 1922 (discharge not determined); mir imum stage recorded,

0.72 foot October 8, 1908 (discharge, 157 second-feet).

ICE. Stage-discharge relation probably never affected by ice.

REGULATION. Negligible.
ACCURACY. Stage-discharge relation permanent, 1907-1909. Rating poorly defined up to 530 second-feet; estimates not attempted above. Read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records poor.

NOTE. Estimates of discharge for August 16, 1922 to September 30, 1923, were prepared, found erratic and therefore discarded. The cofferdam for the new bridge confined the water to a narrow channel and frequent changes in stage-discharge relation must have occurred. A sufficient number of discharge measurements was not obtained.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF HIWASSEE RIVER NEAR HAYESVILLE, N. C.

		Year				Year	
Week				Week			
	1907	1908	1909		1907	1908	1909
1			393	27	380	374	
2			442	28	429	366	
3				29	423	311	479
4			466	30	309	255	437
5			383	31	313	220	432
6			410	32	291	300	454
7				33	402	198	412
8				34	365	356	293
9				35	242	287	271
100				36	250	282	239
11				37	272	218	275
2				38	214	176	251
3				39	422	184	325
4				40	320	166	221
5				41	283	245	228
6				42	215	175	339
7				43	253	295	263
18				44	258	344	231
19				45	296	241	211
200				46	295	269	228
21	430			47	,	221	228
2		465		48	384	278	204
3		414		49	314	291	240
4	474	287		50		475	347
5	437	333		51		371	303
6	438	275		52		472	300

HIWASSEE RIVER AT MURPHY, N. C.

LOCATION. At highway bridge four blocks west of courthouse in Murphy, Cherokee County. Just above Louisville and Nashville Railroad bridge. Valley River enters half a mile below and Nottely River enters 4 miles below.

Drainage Area. 410 square miles (measured on topographic maps).

RECORDS AVAILABLE. June 23, 1896 to June 30, 1917; October 27, 1918 to December 31, 1923.*

E. Chain gage attached to downstream handrail of new concrete bridge; installed January 30, 1921; read by Miss Willie Mingus. Original gage, established July 26, 1896, was a wire gage fastened to downstream guard rail of old highway bridge, which is just below present concrete bridge. In March 1903, the wire was replaced by a chain. Datum remained unchanged until installation of gage on concrete bridge, when gage was made to read 2.0 feet lower. DISCHARGE MEASUREMENTS. Made from concrete highway bridge. Previous to

construction of this bridge, made from old highway bridge.
CHANNEL AND CONTROL. Channel straight for several hundred feet above and below gage. Bed composed chiefly of solid rock. River confined by concrete abutments of bridge. At section used previous to January 1921, the left bank was overflowed slightly at extremely high stages; but right bank was not subject to overflow. Control is rock, boulder and gravel riffle, and pier of railroad bridge; shifts slightly. A fish-trap about 400 feet below gage, constructed about August 1922, has become part of control.

Extremes of Discharge. Maximum stage recorded, 18.4 feet March 19, 1899 (discharge 33,100 second-feet); minimum stage, 4.7 feet October 23, 1904 (discharge, 140 second-feet); on September 18, 1914 also, the mean discharge was

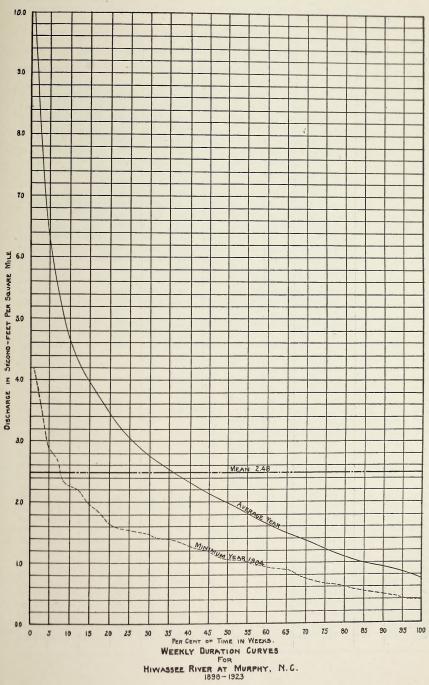
140 second-feet.

ICE. Stage-discharge relation not affected by ice.

REGULATION. Negligible.

ACCURACY. Stage-discharge not permanent. Rating curves used, with definition and periods of use, as follows: October 20, 1897 to December 31, 1899, well defined below 3,000 second-feet and extended above; January 1, 1900 to September 30, 1903, well defined below 5,500 second-feet and extended above; October 1, 1903 to August 10, 1907, well defined below 3,000 second-feet and extended above; August 11, 1907 to December 6, 1908, well defined between 350 and 2,500 second-feet and extended beyond; December 7, 1908 to April 30, 1909, and also April 1, 1912 to June 30, 1917, well defined below 3,500 second-feet and extended above; May 1, 1909 to March 31, 1912, well defined below 3,800 second-feet and extended above; October 27, 1918 to September 30, 1920, well defined between 700 and 3,000 second-feet and extended beyond; October 1, 1920 to January 30, 1921, well defined below 7,000 second-feet and extended above; January 31, 1921 to August 22, 1922, well defined below 7,000 second-feet; October 7, 1922 to October 30, 1923, well defined below 7,000 second-feet. Gage probably read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records up to June 30, 1917, good below 3,500 second-feet and fair above except for extremely high stages. Records after October 27, 1918, good below 7,000 second-feet and fair above.

^{*}Note. From October 13 to December 6, 1908, August 23 to October 6, 1922, and November 31 to December 22, 1923, stage-discharge relation affected by backwater from fish-trap dam a short distance below gage; discharge ascertained by indirect method or derived from comparative discharge hydrographs. The break in the record July 1, 1917 to October 26, 1918 has been filled in with estimate derived from comparative discharge hydrographs using records of Hiwassee River near Appalachia, Tenn and Little Tennessee River at Judson, N. C.



MEAN WEEKLY DISCHARGE, IN SECOND-FEET

1	3 2 2 1	449 680 859 866 769 551 459 472 440 420 483 508 526 301 123 870 156 811 641 537 504 394 381	886 909 811 694 2, 816 2, 816 1, 571 1, 163 2, 639 1, 921 3, 727 6, 400 2, 323 2, 036 1, 120 1, 546 1, 120 962 774 480 480	1900 534 776 1,112 849 565 1,113 3,857 1,364 1,683 2,604 1,557 2,443 1,537 1,436 1,343 1,993 1,984 1,264 886 742 684 684	971 3,106 1,470 1,196 1,710 2,111 1,419 972 809 979 1,069 988 3,877 2,936 1,659 2,169 1,410 1,071 1,436	1,833 1,071 922 909 3,433 1,676 1,089 1,304 4,820 2,437 2,177 1,703 3,319 1,500 1,500 1,193 970 955 755	769 855 752 584 880 2, 629 3, 157 1, 727 4, 184 3, 964 3, 239 2, 373 2, 584 2, 154 1, 487 1, 270	1904 250 270 424 655 370 553 492 1,120 639 1,491 935 1,720 1,173 894 616 644 616 576 770	1905 544 950 879 463 417 1,851 1,401 2,103 944 834 767 1,218 746 694 822 740 726 1,339	1,802 1,229 1,011 2,709 1,260 900 745 706 741 879 1,635 1,679 1,590 1,590 1,434 1,124 863	1,811 1,181 1,025 921 1,537 1,919 1,025 935 2,147 1,413 1,207 939 866 905 893 1,005 1,666	1908 1,901 2,216 1,587 1,300 1,471 1,447 3,319 1,530 1,298 1,134 1,513 3,256 1,473 1,181 1,556 2,240 1,290
2	3 2 2 1	0.80 8.59 8.66 7.69 5.51 4.59 4.72 4.40 4.20 4.83 5.02 5.01 1.23 8.70 1.56 8.11 6.41 5.37 5.04 3.94	909 811 694 2,816 4,710 1,571 1,163 2,639 1,921 3,727 6,400 2,323 1,546 1,120 962 774 645 541 480	776 1,112 849 565 1,113 3,857 1,364 1,683 2,604 1,557 2,443 1,537 1,436 1,343 1,993 1,984 1,264 886 742 684	3,106 1,470 1,196 1,710 2,111 1,419 972 809 979 1,069 988 3,877 2,936 1,680 3,659 2,169 1,410 1,071	1,071 922 909 3,433 1,676 1,089 1,304 4,820 2,437 2,177 1,703 3,319 1,820 1,500 1,193 970 955 755	855 752 584 880 2,629 3,157 1,727 4,184 3,964 3,063 4,483 3,239 2,373 2,584 2,154 1,487 1,270 970	270 424 655 370 553 492 1,120 639 1,491 935 1,720 1,173 894 916 644 616 576	950 879 463 417 1,851 1,401 2,103 944 834 767 1,218 746 694 822 740 726 1,339	1,229 1,011 2,709 1,260 900 745 706 741 879 1,635 1,679 1,657 1,289 1,590 1,434 1,124	1,181 1,025 921 1,537 1,919 1,025 935 2,147 1,413 1,207 939 866 905 893 1,005 1,666	2,216 1,587 1,300 1,471 1,447 3,319 1,530 1,298 1,134 1,513 3,256 1,924 1,473 1,181 1,556 2,240
3	3 2 2 1	859 866 769 551 459 472 440 420 483 508 526 301 123 870 156 811 641 537 504 394	811 694 2,816 4,710 1,571 1,163 2,639 1,921 3,727 6,400 2,323 2,036 1,546 1,120 962 774 645 541 480	1,112 849 565 1,113 3,857 1,364 1,683 2,604 1,557 2,443 1,537 1,436 1,343 1,993 1,984 1,264 886 742 684	1,470 1,196 1,710 2,111 1,419 972 8099 979 1,069 988 3,877 2,936 1,680 3,659 2,169 1,410 1,071 1,436	922 909 3, 433 1,676 1,089 1,304 4,820 2,437 2,177 1,703 3,319 1,820 1,500 1,193 970 955 755 704	752 584 880 2,629 3,157 1,727 4,184 3,964 3,063 4,483 3,239 2,373 2,584 2,154 1,487 1,270 970	424 655 370 553 492 1,120 639 1,491 935 1,720 1,173 894 916 644 616 576	879 463 417 1,851 1,401 2,103 944 834 767 1,218 746 694 822 740 726 1,339	1,011 2,709 1,260 900 745 706 741 879 1,635 1,679 1,289 1,590 1,434 1,124	1,025 921 1,537 1,919 1,025 935 2,147 1,413 1,207 939 866 905 893 1,005 1,666	1,587 1,300 1,471 1,447 3,319 1,530 1,298 1,134 1,513 3,256 1,924 1,473 1,181 1,556 2,240
4	3 2 1	866 769 551 459 472 440 420 483 508 526 301 123 870 156 811 641 537 504 394	694 2,816 4,710 1,571 1,163 2,639 1,921 3,727 6,400 2,323 2,036 1,546 1,120 1,220 962 774 645 541 480	849 565 1,113 3,857 1,364 1,683 2,604 1,557 2,443 1,537 1,436 1,343 1,993 1,984 1,264 886 742 684	1,196 1,710 2,111 1,419 972 809 979 1,069 988 3,877 2,936 1,680 3,659 2,169 1,410 1,071	909 3,433 1,676 1,089 1,304 4,820 2,437 2,177 1,703 3,319 1,820 1,500 1,193 970 955 755 704	584 880 2,629 3,157 1,727 4,184 3,964 3,063 4,483 3,239 2,373 2,584 2,154 1,487 1,270 970	655 370 553 492 1,120 639 1,491 935 1,720 1,173 894 916 644 616 576	463 417 1,851 1,401 2,103 944 834 767 1,218 746 694 822 740 726 1,339	2,709 1,260 900 745 706 741 879 1,635 1,679 1,657 1,289 1,590 1,434 1,124	921 1,537 1,919 1,025 935 2,147 1,413 1,207 939 866 905 893 1,005 1,666	1,300 1,471 1,447 3,319 1,530 1,298 1,134 1,513 3,256 1,924 1,473 1,181 1,556 2,240
5	3 2 1	769 551 459 472 440 420 483 508 526 301 123 870 156 811 641 537 504 394	2,816 4,710 1,571 1,163 2,639 1,921 3,727 6,400 2,323 2,036 1,546 1,120 1,220 962 774 645 541 480	565 1,113 3,857 1,364 1,683 2,604 1,557 2,443 1,537 1,436 1,343 1,993 1,984 1,264 886 742 684	1,710 2,111 1,419 972 809 979 1,069 988 3,877 2,936 1,680 3,659 2,169 1,410 1,071 1,436	3,433 1,676 1,089 1,304 4,820 2,437 2,177 1,703 3,319 1,500 1,193 970 955 755 704	880 2,629 3,157 1,727 4,184 3,964 3,063 4,483 3,239 2,373 2,584 2,154 1,487 1,270 970	370 553 492 1,120 639 1,491 935 1,720 1,173 894 916 644 616 576	417 1,851 1,401 2,103 944 834 767 1,218 746 694 822 740 726 1,339	1,260 900 745 706 741 879 1,635 1,679 1,657 1,289 1,590 1,434 1,124	1,537 1,919 1,025 935 2,147 1,413 1,207 939 866 905 893 1,005 1,666	1,471 1,447 3,319 1,530 1,298 1,134 1,513 3,256 1,924 1,473 1,181 1,556 2,240
6	3 2 2 1	551 459 472 440 420 483 508 526 301 123 870 156 811 641 537 504 394	4,710 1,571 1,163 2,639 1,921 3,727 6,400 2,323 2,036 1,546 1,120 962 774 645 541 480	1,113 3,857 1,364 1,683 2,604 1,557 2,443 1,537 1,436 1,984 1,264 886 742 684	2, 111 1, 419 972 809 979 1, 069 988 3, 877 2, 936 1, 680 2, 169 1, 410 1, 071 1, 436	1,676 1,089 1,304 4,820 2,437 2,177 1,703 3,319 1,820 1,500 1,193 970 955 755 704	2,629 3,157 1,727 4,184 3,964 3,063 4,483 3,239 2,373 2,584 2,154 1,487 1,270 970	553 492 1,120 639 1,491 935 1,720 1,173 894 916 644 616 576	1,851 1,401 2,103 944 834 767 1,218 746 694 822 740 726 1,339	900 745 706 741 879 1,635 1,679 1,657 1,289 1,590 1,434 1,124	1,919 1,025 935 2,147 1,413 1,207 939 866 905 893 1,005 1,666	1,447 3,319 1,530 1,298 1,134 1,513 3,256 1,924 1,473 1,181 1,556 2,240
7	3 2 1	459 472 440 420 483 508 526 301 123 870 156 811 641 537 504 394	1,571 1,163 2,639 1,921 3,727 6,400 2,323 2,036 1,546 1,120 1,220 962 774 645 541 480	3,857 1,364 1,683 2,604 1,557 2,443 1,537 1,436 1,983 1,984 1,264 886 742 684	1,419 972 809 979 1,069 988 3,877 2,936 1,680 3,659 2,169 1,410 1,071 1,436	1,089 1,304 4,820 2,437 2,177 1,703 3,319 1,820 1,500 1,193 970 955 755 704	3,157 1,727 4,184 3,964 3,063 4,483 3,239 2,373 2,584 2,154 1,487 1,270 970	492 1,120 639 1,491 935 1,720 1,173 894 916 644 616 576	1,401 2,103 944 834 767 1,218 746 694 822 740 726 1,339	745 706 741 879 1,635 1,679 1,657 1,289 1,590 1,434 1,124	1,025 935 2,147 1,413 1,207 939 866 905 893 1,005 1,666	3,319 1,530 1,298 1,134 1,513 3,256 1,924 1,473 1,181 1,556 2,240
9	3 2 2 1	440 420 483 508 526 301 123 870 156 811 641 537 504 394	2,639 1,921 3,727 6,400 2,323 2,036 1,546 1,120 962 774 645 541 480	1,683 2,604 1,557 2,443 1,537 1,436 1,343 1,993 1,984 1,264 886 742 684	809 979 1,069 988 3,877 2,936 1,680 3,659 2,169 1,410 1,071 1,436	4,820 2,437 2,177 1,703 3,319 1,820 1,500 1,193 970 955 755	4,184 3,964 3,063 4,483 3,239 2,373 2,584 2,154 1,487 1,270 970	639 1,491 935 1,720 1,173 894 916 644 616 576	944 834 767 1,218 746 694 822 740 726 1,339	741 879 1,635 1,679 1,657 1,289 1,590 1,434 1,124	2,147 1,413 1,207 939 866 905 893 1,005 1,666	1,298 1,134 1,513 3,256 1,924 1,473 1,181 1,556 2,240
10	3 2 1	420 483 508 526 301 123 870 156 811 641 537 504 394	1,921 3,727 6,400 2,323 2,036 1,546 1,120 962 774 645 541 480	2,604 1,557 2,443 1,537 1,436 1,343 1,993 1,984 1,264 886 742 684	979 1,069 988 3,877 2,936 1,680 3,659 2,169 1,410 1,071 1,436	2,437 2,177 1,703 3,319 1,820 1,500 1,193 970 955 755 704	3,964 3,063 4,483 3,239 2,373 2,584 2,154 1,487 1,270 970	1,491 935 1,720 1,173 894 916 644 616 576	834 767 1,218 746 694 822 740 726 1,339	879 1,635 1,679 1,657 1,289 1,590 1,434 1,124	1,413 1,207 939 866 905 893 1,005 1,666	1,134 1,513 3,256 1,924 1,473 1,181 1,556 2,240
11	3 2 1	483 508 526 301 123 870 156 811 641 537 504 394	3,727 6,400 2,323 2,036 1,546 1,120 1,220 962 774 645 541 480	1,557 2,443 1,537 1,436 1,343 1,993 1,984 1,264 886 742 684	1,069 988 3,877 2,936 1,680 3,659 2,169 1,410 1,071 1,436	2,177 1,703 3,319 1,820 1,500 1,193 970 955 755 704	3,063 4,483 3,239 2,373 2,584 2,154 1,487 1,270 970	935 1,720 1,173 894 916 644 616 576	767 1,218 746 694 822 740 726 1,339	1,635 1,679 1,657 1,289 1,590 1,434 1,124	1,207 939 866 905 893 1,005 1,666	1,513 3,256 1,924 1,473 1,181 1,556 2,240
12	3 2 1 1	508 526 301 123 870 156 811 641 537 504 394	6,400 2,323 2,036 1,546 1,120 1,220 962 774 645 541 480	2,443 1,537 1,436 1,343 1,993 1,984 1,264 886 742 684	988 3,877 2,936 1,680 3,659 2,169 1,410 1,071 1,436	1,703 3,319 1,820 1,500 1,193 970 955 755 704	4,483 3,239 2,373 2,584 2,154 1,487 1,270 970	1,720 1,173 894 916 644 616 576	1,218 746 694 822 740 726 1,339	1,679 1,657 1,289 1,590 1,434 1,124	939 866 905 893 1,005 1,666	3,256 1,924 1,473 1,181 1,556 2,240
13	3 2 1 1	526 301 123 870 156 811 641 537 504 394	2,323 2,036 1,546 1,120 1,220 962 774 645 541 480	1,537 1,436 1,343 1,993 1,984 1,264 886 742 684	3,877 2,936 1,680 3,659 2,169 1,410 1,071 1,436	3,319 1,820 1,500 1,193 970 955 755 704	3,239 2,373 2,584 2,154 1,487 1,270 970	1,173 894 916 644 616 576	746 694 822 740 726 1,339	1,657 1,289 1,590 1,434 1,124	866 905 893 1,005 1,666	1,924 1,473 1,181 1,556 2,240
14	1	301 123 870 156 811 641 537 504 394	2,036 1,546 1,120 1,220 962 774 645 541 480	1.436 1,343 1,993 1,984 1,264 886 742 684	2,936 1,680 3,659 2,169 1,410 1,071 1,436	1,820 1,500 1,193 970 955 755 704	2,373 2,584 2,154 1,487 1,270 970	894 916 644 616 576	694 822 740 726 1,339	1,289 1,590 1,434 1,124	905 893 1,005 1,666	1,473 1,181 1,556 2,240
15	1	123 870 156 811 641 537 504 394	1,546 1,120 1,220 962 774 645 541 480	1,343 1,993 1,984 1,264 886 742 684	1,680 3,659 2,169 1,410 1,071 1,436	1,500 1,193 970 955 755 704	2,584 2,154 1,487 1,270 970	916 644 616 576	822 740 726 1,339	1,590 1,434 1,124	893 1,005 1,666	1,181 1,556 2,240
16	1	870 156 811 641 537 504 394	1,120 1,220 962 774 645 541 480	1,993 1,984 1,264 886 742 684	3,659 2,169 1,410 1,071 1,436	1, 193 970 955 755 704	2,154 1,487 1,270 970	644 616 576	740 726 1,339	1,434 1,124	1,005 1,666	1,556 2,240
17	1	156 811 641 537 504 394	1,220 962 774 645 541 480	1,984 1,264 886 742 684	2,169 1,410 1,071 1,436	970 955 755 704	1,487 1,270 970	616 576	726 1,339	1,124	1,666	2,240
18		811 641 537 504 394	962 774 645 541 480	886 742 684	1,071 1,436	755 704	970			863	1 00.	
20		537 504 394	645 541 480	742 684	1,436	704		770	1 100		1,064	1,200
21		504 394	541 480	684					1,193	866	1,186	1,604
22		394	480		3,974		824	578	1,344	618	1,011	1,006
23				649		590	790	452	1,471	660	891	1,022
24		381			1,834	511	1,167	571	878	838	1,326	1,045
25		000	416	1,306	1,236	583	1,676	731	588	739	1,130	759
26		393	600	1,470	1,597	682 570	1,023	392	521 892	1,111	1,001	783
27		405 336	379 336	1,536 2,829	1,163 1,219	572	704 759	428 517	621	786 773	929 999	585 483
28		402	335	1,754	1,089	428	665	365	645	567	736	845
29		585	361	1,029	655	488	1,070	495	2,416	844	1,086	1,016
31		501	419	755	1,107	376	689	354	677	2,010	856	564
32		900	901	855	627	292	500	301	506	1,031	589	439
33		721	418	739	677	290	956	372	404	1,402	1,369	400
34		594	401	461	1,924	228	450	625	650	952	606	590
35		780	394	432	4,030	222	381	810	866	1,439	992	364
36		961	344	559	5,417	203	363	442	716	1,187	1,028	991
37		260	508 430	439	2,521 1,396	242 256	296 300	421 391	426 370	2,289 1,201	515 549	466 558
38		330	349	385 944	1,109	231	341	262	337	1,029	800	376
39 40		898	341	581	1,709	324	305	227	289	1,550	1,834	334
		759	331	408	856	468	254	205	258	2,320	1,159	323
44	5	242	291	329	733	369	209	180	335	3,839	665	290
41	1	760	397	386	765	420	1,623	163	824	1,644	543	504
42		151	339	277	595	330	239	160	333	1,261	460	334
43		261	309	1,049	527	280	209	160	330	1,002	484	581
44	348	977	317	680	494	260	238	186	293	805	516	526
45		948	305	518	489	459	293	198	293	719	596	404
4647	333	969	301	442	479 497	362 395	330 270	232 216	285	897 4,824	618 1,330	466
48	333 326	539 147	355 505	452 1,056	497	808	270	265	351 370	1,244	817	364 436
49	333 326 318 1	471	361	1,424	484	999	219	528	2,629	1,066	566	1,822
50	333 326 318 1 344 1		1,554	669	2,090	588	250	317	1,277	1,336	1,309	1,039
	333 326 318 1 344 1 581 1	115	1,004	1,041	1,246	1,171	275	285	1,083	1,821	1,017	954
52	333 326 318 1 344 1		528	1,041	4,295	774	272	610	1,024	2,120	1,431	1,015

OF HIWASSEE RIVER AT MURPHY, N. C.

							Year								1
1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	Week
1,181	1,004	2,395	1,226	684	520	1,149	1,547	1,458	489	2,500	486	1,036	671	1,789	1
930	994	848	936	814	401	1,269	1,566	1,101	947	1,188	738	1,770	1,467	807	2
1,706	819	659	748	764	339	1,609	1,337	1,569	989	1,088	1,105	1,446	4,986	918	3
953	927	619	624	1,769	392	1,666	1,561	1,671	1,143	1,828	2,946	1,079	2,887	1,829	4
764	791	764	1,759	1,213	536	1,867	2,871	1,881	2,729	1,216	1,509	1,010	1,244	1,881	5
1,719	755	1,439	809	936	726	1,441	1,536	1,197	1,100 1,330	989 1,214	1,353 951	3,348	1,524 2,634	2,264 $2,477$	6
2,403	1,096	2,713	1,279 1,687	1,278 1,309	624 821	1,224 1,163	1,134 1,005	1,144 2,930	1,386	1,740	1,259	1,803	1,401	1,156	8
2,516	1,236 1,655	938 872	1,960	1,309	629	1,103	1,219	4,141	911	1,421	937	1,257	1,974	1,190	9
1,667 2,141	999	815	1,407	1,101	547	1,144	1,177	3,708	869	2,414	1,234	1,030	3,326	1,474	
4,374	803	670	2,569	4,863	1.090	845	940	1,776	800	1,434	1,649	914	2,323		11
2,333	676	770	1,883	1,766	669	805	805	2,808	795	1,172	1,948	1,082	1,883	1,920	
2,469	545	1,086	4,337	3,800	829	789	940	3,394	706	1,384	2,169	1,129	2,456	1,269	
1,436	545	2,769	1,750	1,467	773	708	856	2,149	806	1,016	5,530	979	1,999	1,219	14
1,371	546	2,938	1,217	1,174	1,051	645	837	1,766	906	1,106	2,238	836	1,513	1,866	15
1,226	965	1,686	1,287	964	1,702	541	766	1,351	916	1,291	1,610	1,387	1,940	1,361	
1,631	710	1,314	1,687	833	886	565	665	1,210	886	885	1,520	1,289	1,577	1,209	
3,069	630	1,043	1,801	707	702	480	586	1,243	931	913	1,130	1,004	2,366	1,190	
2,124	2,047	834	1,193	713	635	1,062	711	1,063	954	1,189	1,116	974	1,876	1,160	
1,711	992	747	904	697	466	647	575	876	991	846	1,172	1,016	1,310	1,800	
4,213	2,761	1,005	764	1,077	396	614	2,038	786	1,091	759	1,044	1,290	1,247	1,819	
1,740	1,212	673	1,216	924	375	742	959	869	689 706	676 541	872 860	795 671	1,151 1,199	2,760 1,503	
3,474	1,592	551	787	1,301	417	597	856	997 901	634	508	653	550	1,225	1,646	
1,624	1,371	420	749	701	324 343	590 475	1,517 971	735	763	674	969	530	875	1,138	
1,490	1,094	474 446	656 $1,264$	547 565	249	456	1.040	554	863	1,436	799	531	794	1,320	1
1,456 1,585	972 1,417	469	1,204	475	231	891	685	620	627	1,122	679	398	694	980	
1,561	1,267	682	1,124	549	333	659	4,540	540	479	761	562	466	687	903	28
921	872	963	3,133	367	422	456	3,213	823	524	857	1,233	661	886	1,039	29
849	892	519	770	386	242	345	2,314	751	703	676	842	524	770	775	
1,139	738	668	862	417	285	352	1,623	600	589	607	540	485	500	709	1
826		442	650	444	333	273	1,486	666	411	518	953	491	507	1,020	1
891	579	370	557	338	285	353	1,041	663	396	1		732	451	726	
537	638	288	488	391	238	468	799	511	369		1,890	490	473	748 597	
481	675	355	397	295	255	422	643	756	361	502 340	1,136	400 312	453 437	519	
477		399	383	304	201	368	603	671 537	413 366		1,233		536		
543		321	394	265	205	345	556 460		459		773	273	434	404	
716		352	794	312	219	355 248	657	711	417	237	620		380		
576	1	284	588	328 286	201 268	1,243	450		324		520		368		
448		265 401	420 348	1		535	399		306		455	1	386	280	41
463 1,115		553	531	341	835	779	669		334	1	410	263	286		42
475		410	458		316	631	417		994				368		
380	1		396			423	546				420	1	283		14
375			502			395	426		767		390				
410	1		447	1		709	554			1			296		46
410	1		376	1	340	833	512								48
388	1		352			500					1			2002) 49
666	1,163	420				428			651				1		6 50
1,012				1	819	541	689								4 51
653						3,248									9 52
739	630	1,464	641	489	2,509	3,022	908	120	1,02						

Monthly Discharge of Hiwassee River at Murphy, N. C. [Drainage area, 410 square miles]

		Discharges in	Second-feet	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1897				3.0	
November	540	305	339	.827	.92
December 1898	3,270	335	753	1.84	2.12
January	3,990	375	960	2.34	2.70
February	700	420	509	1.24	1.29
March.	9,930	420	1,090	2.66	3.07
April	5,790	745	1,390	3.39	3.78
May	890	375	583	1.42	1.64
June	615	320	380	.927	1.0
July	1,360	305	618	1.51	1.74
August	7,950	700	2,100	5.12	5.90
September	15,200	540	2,480	6.05	6.78
October	15,900	615	2,450	5.98	6.89
November		790	1,130	2.76	3.08
December	1,230	790	960	2.34	2.70
The year	15,900	305	1,221	2.97	40.5
1899	10,500	000	1,221	2.01	10.01
January	1,500	615	817	1.99	2.29
February		700	2,860	6.98	7.27
March	23,100	1,230	3,430	8.37	9.68
April.	2,920	1,000	1,490	3.63	4.05
May	1,230	475	690	1.68	1.94
June	890	292	440	1.07	1.19
July		202	543	1.32	.98
August	790	335	407	.993	1.14
September		305	371	.905	1.0
October		268	334	.815	.94
November	840	292	353	.861	.90
December	6,330	335	771	1.88	2.1
The year	23,100	-1	1,042	2.54	33.59
1900 January	2,270	440	800	1.95	2.2
February.		388	1,780	4.34	4.55
March.	1	1,300	2,070	5.05	5.85
April.		1,030	1,660	4.05	4 55
May		600	841	2.05	2.30
June	3,340	600	1,650	4.02	4.48
July		600	1,140	2.78	3.20
August		375	503	1.23	1.49
September		315	574	1.40	1.50
October	1	215	507	1.24	1.4
November.	2,440	408	646	1.58	1.70
December	2,340	515	1,020	2.49	2.87
The year	13,100	215	1,099	2.68	36.19
		-			

MONTHLY DISCHARGE OF HIWASSEE RIVER AT MURPHY, N. C.—Continued

			Discharges i	n Second-fee	t	
	Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inche
4	1901			*		
		6,940	695	1,660	4.05	
_		4,060	800	1,500	4.05 3.66	4.
		9,820	748	1,600	3.90	3.
		10,900	1,450	2,550	6.22	4.
		9,460	800	1,990	4.85	6 . 5 .
		2,100	910	1,340	3.27	3.
		3,160	515	868	2.12	2.
		13,200	440	3,110	7.59	8.
_		3,340	800	1,330	3.24	3.
		1,610	478	640	1.56	1.
		600	408	478	1.17	1.
		14,300	440	2,000	4.88	5.
The year	ar	14,300	408	1,588	3 .88	52 .
	1902					
	•	3,340	800	1,270	3.10	3
		15,900	970	2,320	5.66	5
		10,000	1,380	2,590	6.32	7
-		2,270	910	1,390	3.39	3
		1,030	478	706	1.72	1
		748	440	598	1.46	. 1
		695	260	389	.949	1
		440	198	237	.578	
-		648	198	336	.820	
		648	260	341	.832	
		1,300 2.270	260 478	455 873	1.11 2.13	1 2
The year	ar	15,900	198	959	2.34	31
	1903					
	••••••	1,230	345	733	1.79	2
		12,000	600	2,530	6.17	6
		11,600	1,690	3,720	9.07	10
*		4,060	1,230	2,150	5.24	5 2
-		1,770	648	950	2.32	2.
		2,620	600	1,100	2.68	2.
		1,530	478 288	717 496	1.75	1.
		2,100	288	299	.729	1.
		648	238	299	.602	
		1,000	205	281	.685	
		570 430	205	253	.617	
	ιτ	12,000	205	1,123	2.74	36.

MONTHLY DISCHARGE OF HIWASSEE RIVER AT MURPHY, N. C.—Continued

	Discharges in Second-feet				
Month -	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1904					
January	1,500	205	397	.968	1.12
February	1,860	340	663	1.62	1.78
March	3,990	530	1,260	3.07	3.5
April	1,790	530	765	1.87	2.09
May	1,230	400	595	1.45	1.6
June	2,250	312	520	1.27	1.45
July	1,300	258	377	.92	1.00
August	2,920	312	558	1.36	1.53
September	655	205	278	.678	.76
October	180	140	166	.405	.47
November	285	160	217	.529	.59
December	1,720	258	434	1.06	1.22
The year	3,990	140	519	1.27	17.26
1905 January	1,940	370	680	1.66	1.91
February	5,790	400	1,520	3.71	3.86
March	2,580	655	889	2.17	2.50
April	2,580	570	804	1.96	2.19
May	2,920	790	1,250	3.05	3.52
June	2,250	460	653	1.59	1.77
July	8,490	430	1,020	2.49	2.87
August	1,790	370	637	1.55	1.79
September	460	258	319	.778	.87
October	3,630	258	441	1.08	1.24
November	495	285	315	.768	.86
December	7,950	370	1,420	3.46	3.99
The year	8,490	258	823	2.02	27.37
1906	7 050	700	1 660	4.05	4 07
January	7,050		1,660 816	4.05 1.99	4.67 2.07
February	1,230	610 610	1,360	3.32	3.83
April.	3,630	890	1,300	3.34	3.73
	1,430	530	729	1.78	2.05
May		340	890	2.17	2.03
June	2,090 2,410	495	1,100	2.17	3.09
JulyAugust	5,610	700	1,100	3.54	4.08
	7,230	700	1,450	3.76	4.08
September October	6,150	840	1,830	4.46	5.14
	18,400	655	1,830	4.44	5.14 4.95
November	3,990	1,000	1,820	3.83	4.95
The year	18,400	340	1,345	3.28	44.65

MONTHLY DISCHARGE OF HIWASSEE RIVER AT MURPHY, N. C.-Continued

	Discharges in Second-feet				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907					
January	2,410	840	1,200	2.93	3.38
February	3,630	840	1,410	3.44	3.58
March	4,890	790	1,320	3.22	3.71
April	2,920	745	1,120	2.73	3.05
May	1,640	745	1,020	2.49	2.87
June	2,250	745	1,110	2.71	3.02
July	5,610	530	973	2.37	2.73
August	1,710	488	776	1.89	2.18
September	10,200	425	1,040	2.54	2.18
October	848	425	531	1.29	1.49
November	2,980	455	814	1.99	2.22
December	2,310	552	1,070	2.61	3.01
The year	10,200	425	1,032	2.52	34.07
1908					
January	6,210	1,000	1,680	4.10	4.73
February	8,730	1,110	1,950	4.76	5.13
March	7,470	1,000	1,890	4.61	5.32
April	4,230	1,000	1,560	3.80	4.24
May	3,510	800	1,230	3.00	3.46
June	1,280	455	668	1.63	1.82
July	2,000	395	688	1.68	1.94
August	2,000	340	581	1.42	1.64
September	1,220	295	398	.971	1.08
October	1,400	260	444	1.08	1.24
November	618	295	407	.993	1.11
December	7,070	455	1,170	2.85	3.29
The year	8,730	260	1,056	2.57	35.00
January	3,110	730	1,150	2.80	3.23
February	5,270	690	1,980	4.83	5.03
March	8,690	1,260	2,690	6.56	7.56
April	2,000	1,110	1,430	3.49	3.89
May	8,330	1,140	2,680	6.54	7.54
June	7,790	1,200	2,010	4.90	5.47
July	4,190	735	1,200	2.93	3.38
August	3,110	455	791	1.93	2.22
September	1,600	425	572	1.40	1.56
October	3,830	370	602	1.47	1.70
November	490	350	393	.959	1.07
December	1,670	385	742	1.81	2.09
The year	8,690	350	1,353	3.30	44.74

MONTHLY DISCHARGE OF HIWASSEE RIVER AT MURPHY, N. C .- Continued

	Discharges in Second-feet				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1910					
January	3,110	640	924	2.25	2.59
February	3,110	680	980	2.39	2.48
March	3,830	512	952	2.32	2.68
April	2,130	512	686	1.67	1.86
May	4,550	550	1,600	3.90	4.50
June	3,290	795	1,240	3.02	3.37
July	2,130	710	982	2.40	2.77
August	975	475	629	1.53	1.76
September	1,070	365	537	1.31	1.46
October	752	295	385	.939	1.08
November	550	295	326	.795	.89
December	3,850	295	642	1.57	1.81
The year	4,550	295	823	2.01	27.25
1911			1 100		
January	5,510	590	1,100	2.68	3.09
February	2,760	710	1,110	2.71	2.82
March	1,670	630	844	2.06	2.38
April	5,730	795	2,100	5.12	5.71
May	1,860	630	878	2.14	2.47
June	795	370	488	1.19	1.33
July	2,760	335	627	1.53	1.76
August		270	435	1.06	1.22
September	630	270	340	.829	.92
October	930	205	402	.980	1.13
November.	885	335	532	1.30	1.45
December	2,430	370	787	1.92	2.21
The year	5,730	205	804	1.96	26.49
January	3,650	590	1,040	2.54	2.93
February	3,470	710	1,420	3.46	3.73
March	10,500	1,220	2,410	5.88	6.78
April	2,270	1,110	1,540	3.76	4.20
May	3,290	690	1,170	2.85	3.29
June	2,000	570	863	2.10	2.34
July	6,170	610	1,450	3.54	4.08
August	1,210	372	584	1.42	1.64
September	3,470	320	528	1.29	1.44
October	1,020	320	432	1.05	1.21
November	690	352	424	1.03	1.15
December	1,530	352	568	1.39	1.60
The year	10,500	320	1,036	2.53	34.39
	l=====================================				

MONTHLY DISCHARGE OF HIWASSEE RIVER AT MURPHY, N. C.—Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1913					
January	3,470	570	1,050	2.56	2.95
February	3,650	770	1,190	2.90	3.02
March	12,600	850	2,720	6.63	7.64
April	1,750	770	1,120	2.73	3.05
May	2,580	570	841	2.05	2.36
June	2,930	455	774	1.89	2.11
July	1,110	290	447	1.09	1.26
August	610	260	384	.937	1.08
September	930	205	298	.727	.81
October	765	230	303	.739	.85
November	460	255	293	.715	.80
December	765	280	388	.946	1.09
The year	12,600	205	817	1.99	27.02
1914 January	605	308	413	1.01	1.16
February	1,110	460	706	1.72	1.79
March.	2,270	495	751	1.83	2.11
April	3,110	645	1,090	2.66	2.97
May	845	335	516	1.26	1 43
June	605	230	337	.822	.92
July	765	185	298	.727	.84
August	605	208	286	.698	.80
September	335	140	208	.507	.57
October	2,580	185	398	.971	1.12
November	5,090	230	503	1.23	1.37
December	5,450	605	1,650	4.02	4.64
The year	5,450	140	596	1.45	19.74
January	2,580	888	1,400	3.41	3.93
February	3,830	930	1,420	3.46	3.60
March	1,420	725	909	2.22	2.56
April	845	495	618	1.51	1.68
May	2,270	460	619	1.51	1.74
June	1,580	335	572	1.40	1.56
July	1,700	280	567	1.38	1.59
August	888	255	383	.934	1.08
September	605	230	327	.798	.89
October	2,930	395	763	1.86	2.14
November	1,810	365	591	1.44	1.61
December	12,300	395	1,770	4.32	4.98
The year	12,300	230	828	2.02	27.57

DISCHARGE RECORDS OF

MONTHLY DISCHARGE OF HIWASSEE RIVER AT MURPHY, N. C.-Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1916					
January	2,270	1,160	1,480	3.61	4.16
February	7,070	940	1,590	3.88	4.18
March	1,720	760	1,030	2.51	2.89
April	985	590	776	1.89	2.11
May	5,450	440	987	2.41	2.78
June	3,290	670	1,080	2.63	2.93
July	9,950	510	2,540	6.20	7.15
August	2,750	590	1,130	2.76	3.18
September	1,940	408	572	1.40	1.56
October	2,000	375	495	1.21	1.40
November	850	408	520	1.27	1.42
December	1,770	510	733	1.79	2.06
The year	9,950	375	1,078	2.63	35 .82
1917	0.020	050	4 440	0.71	4.05
January	2,930	850	1,440	3.51 4.46	4.03
March	6,170	895	1,830	9.22	10.63
	15,400	1,570	3,780	4.12	4.60
April	3,290 1,390	1,120 670	1,690	2.31	2.66
May June	1,880	590	948	2.07	2.00
July	1,600	480	847 674	1.64	1.89
August	900	380	590	1.43	1.64
September	1.800	360	664	1.61	1.85
October	720	390	486	1.18	1.36
November	540	380	437	1.06	1.22
December.	520	360	441	1.07	1.23
The year	15,400	360	1,152	2.80	38.08
1918					0.05
January	4,500	430	1,202	2.90	3.37
February	3,100	880	1,300	3.17	3.65
March	960	620	807	1.96	2.26
April	1,300	660	870	2.12	2.44
May	1,500	640	960	2.34	2.69
June	1,000	540	705	1.71	1.97
July	1,600	410	628	1.53	1.76
August	660	310	409	.997	1.14
September	760	270	407	.992 2.41	2.77
October	8,320	290	989		2.77
November	2,040 13,100	550 550	832 1,730	2.03	4.86
The year	13,100	270	903	2 ,20	29.71

MONTHLY DISCHARGE OF HIWASSEE RIVER AT MURPHY, N. C.-Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1919		2 .			
January	4,110	975	1,620	3.95	4.5
February	2,880	885	1,310	3.20	3.3
March	3,050	975	1,580	3.85	4.4
April	1,750	795	1,070	2.61	2.9
May	1,890	630	903	2.20	2.5
June	2,040	475	770	1.88	2.1
July	2,540	550	838	2.04	2.3
August	885	405	511	1.25	1.4
September	475	225	301	.734	.8
October	1,270	225	380	.93	1.0
November	630	340	401	.98	1.0
December	6,280	405	1,090	2.66	3.0
The year	6,280	225	898	2.19	29.7
1920 January	5,090	405	1,350	3.29	3.7
February	2,540	795	1,190	2.90	3.1
March	4,070	795	1,660	4.05	4.6
April	13,100	1.270	2,640	6.44	7.1
May	1,380	795	1,100	2.68	3.0
June	1,500	630	819	2.00	2.2
July	2,200	475	805	1.96	2.2
August	4,070	475	1.580	3.85	4.4
September	1,500	550	899	2.19	2.4
October	800	390	456	1.11	1.2
November	2,040	360	561	1.37	1.5
December	9,200	530	1,540	3.76	4.3
The year	13,100	360	1,217	2.97	40 .3
January	2,800	750	1,310	3.20	3.6
February	7,560	920	2,080	5.07	5.2
March	1,690	830	1,040	2.54	2.9
April	2,180	785	1,130	2.76	3.0
May	2,180	830	1,050	2.56	2.9
June	740	475	584	1.42	1.5
July	920	355	515	1.26	1.4
August	1,010	380	528	1.29	1.4
September	920	240	356	.868	.97
October	620	240	318	.776	.89
November	1,920	330	778	1.90	2.1
December	2,760	510	918	2.24	2.58
The year	7,560	240	884	2.16	29.01

MONTHLY DISCHARGE OF HIWASSEE RIVER AT MURPHY, N. C.—Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1922					
January	13,800	660	2,390	5.83	6.72
February	5,960	1,100	1,700	4.15	4.32
March.	5,960	1,380	2,490	6.07	7.00
April	2,760	1,280	1,780	4.34	4.84
May.	4,680	920	1,610	3.93	4.53
June	2,600	660	1,060	2.59	2.89
July	1,380	580	747	1.82	2.10
August	700	380	473	1.15	1.33
September	995	335	446	1.09	1.22
October	825	270	346	.844	.97
November	540	250	299	.729	.81
December	9,940	270	1,530	3.73	4.30
The year	13,800	250	1,239	3.02	41.03
January	4,360	695	1,360	3.32	3.83
February	5,080	1,010	1,920	4.68	4.87
March	4,010	1,010	1,800	4.39	5.06
April	3,500	960	1,400	3.41	3.80
May	4,180	960	1,720	4.20	4.84
June	2,990	960	1,490	3.63	4.05
July	1,910	615	915	2.23	2.57
August	1,910	540	778	1.90	2.19
September	615	285	416	1.01	1.13
October -	505	260	311	.759	.88
November.	655	225	325	.793	.88
December	1,770	345	804	1.96	2.20
The year	5,080	225	1,103	2.69	36.36

HIWASSEE RIVER NEAR APALACHIA, TENN.

- LOCATION. Close to North Carolina-Tennessee boundary, 1½ miles above station of Louisville and Nashville Railroad at Apalachia, Polk County.

- Drainage Area. 1,042 square miles.

 Records Available. January 1, 1914 to December 31, 1922.

 Gage. Vertical staff on right bank 700 feet below boundary crossing; read by Ethel Blackwell and Blanch Cole.
- DISCHARGE MEASUREMENTS. Made from boat at gage section.
- Channel and Control. No information.

 Extremes of Discharge. Maximum stage recorded, 10.50 feet April 2, 1920 (discharge, 24,144 second-feet); minimum stage, 0.0 foot September 18 and 29, and October 1 and 2, 1914 (discharge, 360 second-feet).
- ICE. No information.
- REGULATION. No information.
- ACCURACY. One rating curve used over entire period of record. Records probably fair, but may be considerably in error for high and low stages.
- COOPERATION. Daily-discharge record, and monthly values for maximum, minimum, and mean discharge and discharge per square mile furnished by Mr. J. A. Switzer, engineer for Thompson Power Co.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF HIWASSEE RIVER AT APALACHIA, TENN.

					Year				2000
Week					- 1				
	1914	1915	1916	1917	1918	1919	1920	1921	1922
1	1,181	2,295	3,582	3,755	1,272	5,802	1,546	2,518	2,01
2	961	2,389	3,415	2,662	2,423	2,962	1,874	3,721	3,31
3	797	2,904	3,131	4,206	2,549	2,829	2,781	3,548	8,10
4	907	3,333	3,636	4,029	2,927	4,253	5,412	2,592	7,58
5	1,265	3,582	5,960	4,712	6,985	3,007	3,939	2,559	3,36
6	1,726	3,169	3,646	3,046	2,818	2,517	3,357	8,535	3,4
7	1,529	2,826	2,638	2,971	3,452	3,156	2,582	5,234	6,9
8	1,920	2,751	2,402	7,879	3,610	4,003	3,535	4,023	3,4
9	1,492	2,638	2,931	9,395	2,411	3,496	2,475	3,231	5,0
0	1,373	2,963	2,807	7,475	2,262	5,497	3,086	2,726	6,6
1	2,166	2,365	2,250	4,857	2,068	3,696	4,048	2,538	5,6
2	1,657	2,239	2,017	9,209	2,079	2,971	4,458	2,697	4,1
3	2,054	2,190	2,399	8,621	1,815	3,289	6,354	2,359	5,3
4	1,945	2,057	2,108	6,189	2,082	2,604	12,824	2,508	4,6
5	2,458	1,959	2,048	4,602	2,457	2,888	4,873	2,230	3,7
6	3,509	1,619	1,901 -	3,438	2,358	3,249	4,064	3,979	4,6
7	2,111	1,537	1,749	3,369	2,310	2,619	3,923	3,218	3,8
.8	1,867	1,501	1,619	3,305	2,479	2,634	3,194	2,597	6,1
9	1,697	3,046	1,437	2,694	2,483	3,119	3,009	2,516	4,4
0	1,400	1,982	1,474	2,280	2,604	2,379	2,892	2,550	3,0
1	1,144	1,667	4,422	2,190	2,799	2,097	2,698	2,900	3,1
22	998	1,611	2,350	2,202	1,779	1,843	2,336	2,118	3,0
23	1,108	1,637	2,007	2,742	1,815	1,611	2,289	1,920	4,1
24	861	1,635	3,473	2,536	1,626	1,602	1,759	1,730	3,5
25	1,053	1,364	2,379	2,193	2,000	1,969	2,356	1,807	2,8
26	659	1,254	2,115	1,806	2,259	3,222	1,857	1,657	2,1
27	587	2,371	1,733	1,610	1,642	2,675	1,791	3,315	2,2
28	788	1,719	8,550	1,400	1,254	1,994	1,519	1,575	2,2
29	1,551	1,291	5,439	2,122	1,354	2,135	3,657	1,964	2,4
30	678	998	4,727	1,945	1,834	1,894	1,850	1,697	2,0
31	760	925	3,123	1,565	1,541	1,510	1,345	1,653	1,5
32	1,135	815	3,428	1,728	1,080	1,616	3,699	2,025	1,6
33	971	1,203	2.510	1,737	1,035	1,774	7,640	2,246	1,4
34	659	1,239	2,130	1,336	961	1,411	4,648	1,656	1,4
5	760	979	1,777	2,009	934	1,635	2,967	1,437	1,3
6	523	1,080	1,677	1,758	1,071	1,089	2,550	1,181	1,1
7	514	961	1,576	1,345	905	1,071	3,809	971	1,4
8	642	944	1,336	1,364	1,191	888	2,243	971	1,3
9	514	751	1,496	1,781	1,053	797	1,874	1,720	9
0	788	2,897	1,272	1,382	834	879	1,739	1,629	9
1	605	1,401	1,181	1,117	788	1,108	1,537	1,035	1,1
2	2,281	1,849	1,496	1,126	852	1,369	1,409	925	1,0
3	934	1,758	1,208	1,336	2,372	2,680	1,465	952	1,0
4	760	1,218	1,484	1,428	6,545	1,327	1,492	1,609	9
5	898	1,071	1,199	1,181	1,952	1,144	1,428	1,318	9
6	1,294	1,543	1,559	1,149	1,799	1,520	1,978	2,373	9
7	1,071	1,858	1,559	1,080	1,788	1,135	1,676	2,505	1,0
8	2,664	1,409	1,723	1,205	2,099	1,529	1,733	3,607	1,0
9	5,066	1,190	1,635	1,053	1,657	2,648	2,213	2,789	2,7
0	2,011	1,437	1,839	1,190	2,904	4,542	4,362	1,835	3,7
1	1,758	6,349	1,792	1,299	7,029	2,306	3,427	1,924	6,7
2	6,054	6,791	2,761	1,086	4,138	1,721	3,792	3,486	2, 2

Monthly Discharge of Hiwassee River at Apalachia, Tenn. [Drainage area, 1,042 square miles]

		Discharges i	n Second-fee	et	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1914					
January	1,446	742	961	0.00	1 00
February	2,625	1,126	1,676	0.92	1.06
March	3,108	1,313	1,739	1.61	1 68
April	5,463	1,638	2,491	2.39	1.93
May	2,250	998	1,442	1.38	2.67 1.59
June	1,638	614	938	0.90	
July	2,397	486	883	0.90	1.00
August	1,701	550	876		.980
September	1,190	360		0.84	.968
October	6,693		555	0.53	.591
November		360	1,116	1.07	1.23
December	7,761	678	1,246	1.20	1.34
December	12,405	1,638	3,786	3 .63	4.18
The year	12,405	360	1,476	1.42	19.22
January	4,383	1,701	2,694	2.59	2.99
February	5,349	2,322	3,131	3.00	3.12
March.	3,627	1,968	2,452	2.35	2.71
April	2,322	1,510	1,806	1.73	1.93
May	5,697	1,382	1,994	1.91	2.20
June	2,397	998	1,501	1.44	1.61
July	4,692	806	1,541	1.48	1.71
August	2,625	742	1,051	1.01	1.16
September	1,701	614	934	0.90	1.00
October	6,435	1,190	1,913	1.84	2.12
November	2,250	998	1,404	1.35	1.51
December	20,403	1,126	3,645	3.50	4.04
The year	20,403	614	2,006	1.93	26.10
1916					0.70
January	5,124	2,547	3,367	3.23	3.72
February	12,663	2,178	3,584	3.44	3.71
March	4,284	1,899	2,525	2,42	2.79
April	2,250	1,638	1,944	1.86	2.08
May	10,986	1,382	2,298	2.20	2:54
June	5,937	1,767	2,482	2.38	2.66
July	15,759	1,510	4,873	4.67	5.38
August	3,807	1,701	2,586	2.48	2.86
September	2,625	1,190	1.533	1.47	1.64
October	2,625	1,126	1,319	1.26	1.45
November	2,625	1,126	1,478	1 42	1.58
December	5,349	1,446	2,020	1.94	2.24
The year	15,759	1,126	2,501	2.40	32.65

MONTHLY DISCHARGE OF HIWASSEE RIVER AT APALACHIA, TENN.—Continued

		Discharges i	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1917					
January	5,937	2,106	3,648	3.50	4.0
February	14,211	2,397	4,727	4.54	4.73
March	20,403	4,185	8,666	8.32	9.59
April	8,277	3,024	4,410	4.23	4.71
May	3,627	1,968	2,485	2.39	2.76
June	4,905	1,701	2,345	2.25	2.5
July	4,089	1,254	1,750	1.68	1.94
August	2,322	998	1,553	1.49	1.72
September	4,587	934	1,706	1 .64	1.83
October	1,833	998	1,268	1.22	1.41
November	1,446	998	1,145	1.10	1.23
December	1,382	934	1,153	1.11	1.28
The year	20,403	934	2,905	2.79	37.70
1918 January	11,373	1,126	3,088	2.96	3.4
February	8,019	2,322	3,368	3.23	3.3
March	2.472	1,638	2,092	2.01	2.3
April	3,550	1,701	2,295	2.20	2.4
May	4,089	1,638	2,488	2.39	2.7
June	2,547	1,382	1,829	1.74	1.9
July	4,284	1,062	1,639	1.57	1.8
August	1,767	806	1,072	1.03	1.1
September	1,968	678	1,047	1.00	1.1
October	19,113	742	2,128	2.04	2.3
November	4,797	1,510	2,116	2.03	2.2
December	19,113	1,510	3,805	3.65	4.2
The year	19,113	678	2,247	2.15	29.20
January	9,438	2,472	3,892	3.73	4.30
February		2,722	3,227	3.10	3.2
March	8,793	2,625	3,823	3.67	4.2
April		2,250	2,754	2.64	2.9
May	4,587	1,899	2,480	2.37	2.73
June	4,905	1,510	2,063	1.98	2.2
July.	3,993	1,510	2,132	2.04	2.3
August	2,322	1,126	1,599	1.53	1.76
September		742	998	0.96	1.07
October	1,660	742	1,493	1.43	1.6
November	1,899	998	1,312	1.26	1.43
December	11,631	1,254	2,692	2.58	2.97
The year.	11,631	742	2,372	2.27	30.86
	-				

Monthly Discharge of Hiwassee River at Apalachia, Tenn.—Continued

		Discharges in	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1920					
January	9,696	1,446	3,012	2.89	9 99
February	6,825	2.178	3,178	3.05	3.33
March	11,373	2,178	4,145	3.98	4.59
April	24,144	3,450	6,326	6.07	6.77
May	3,717	2,250	2,866	2.75	3.17
June	2,943	1,510	2,089	2.00	2.23
July	6,309	1,318	2,135	2.05	2.36
August	10,857	1,126	4,327	4.15	4.78
September	5,235	1,574	2,619	2.51	2.80
October -	1,899	1,382	1,533	1.47	1.70
November	3,363	1,318	1,672	1.60	1.79
December	11,889	1,767	3,350	3.22	3.71
The year	24,144	1,126	3,104	2.98	40.52
1921					
January	5,349	2,178	3,052	2.93	3.38
February	19,113	2,397	5,170	4.96	5.17
March	3,900	1,833	2,628	2.52	2.91
April	6,564	2,037	2,981	2.86	3.19
May	4,383	2,037	2,587	2.48	2.86
June	2,037	1,574	1,806	1.73	1.93
July	2,250	1,254	1,685	1.62	1.87
August	3,450	1,382	1,580	1.52	1.75
September	2,781	870	1,222	1.17	1.31
October	2,106	870	1,131	1.09	1.26
November	5,580	1,254	2,371	2.27	2.53
December	7,761	1,574	2,575	2.47	2 .85
The year	19,113	870	2,399	2.30	31.01
January	21,693	1,899	5,119	4.91	5.66
February	11,631	2,943	4,308	4.13	4.30
March.	12,663	3,450	5,570	5.35	6.17
April	6,693	3,450	4,256	4.08	4.55
May	12,018	2,472	4.002	3.84	4.43
June	5,937	2,178	3.263	3.13	3.49
July	3,108	1,701	2,187	2.10	2.42
August	2,547	1,126	1,494	1.43	1.65
September	2,703	870	1,210	1.16	1.29
October	1,899	870	1,058	1.02	1:18
November	1,062	806	945	.91	1.02
December	14,598	998	3,641	3.49	4.02
The year,	21,693	806	3,088	2.96	40.18

HIWASSEE RIVER AT RELIANCE, TENN.

LOCATION. At county highway bridge at Reliance, Polk County, one-fourth mile below Louisville and Nashville Railroad bridge, 114 miles below the mouth of Lost Creek, 13/4 miles above the mouth of Spring Creek and 14 miles above the confluence of Hiwassee and Ocoee rivers.

Drainage Area. 1,180 square miles.

RECORDS AVAILABLE. August 17, 1900 to December 31, 1913; and February 1, 1919, to December 31, 1923.*

Chain gage attached to downstream railing of bridge, installed November 10, 1921; read by Warner Smith. Previous to this date gage was vertical staff in 2 sections, located 150 feet upstream from the Louisville and Nashville Railroad bridge. New gage was set so as to read about the same as the staff gage at a stage of 1.5 feet. There is practically no intervening drainage and the flow at both points is the same.

DISCHARGE MEASUREMENTS. Made from 5-span highway bridge during high and medium stages and from railroad bridge during low stages. Highway bridge section is rocky and shallow and is not suitable for stages below 2.0 feet. Railroad bridge makes a decided angle with the current and angle corrections are

CHANNEL AND CONTROL. Channel is wide and shallow, bed composed of coarse gravel and boulders. Right bank subject to overflow at stages above 8 feet; left bank high and is not overflowed. Control is coarse gravel and rock shoal at head of island 100 feet downstream from gage.

Extremes of Discharge. 1900-1913; 1919-1923: Maximum stage recorded, 15.2

feet November 19, 1906; minimum stage, 0.70 feet October 19-26, 1904 (dis-

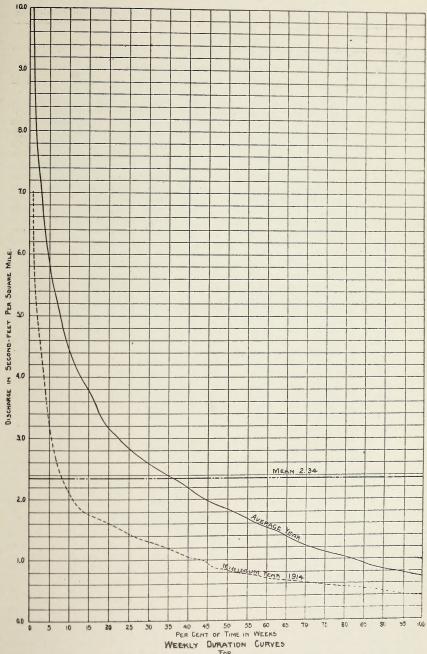
charge, 380 second-feet).

Stage-discharge relation not affected by ice.

REGULATION. None of any consequence.

ACCURACY. Stage-discharge relation not permanent. Rating curves usually to March 31, well defined below 12,000 second-feet; extended above. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good for medium stages; fair above and probably good for low water.

^{*}Note. The break in the record has been filled in for the tables with an estimate derived from a comparison of gage realtionship between a gage operated for the period January 1, 1914 to December 31, 1922 at Apalachia, Tenn., by the Thompson Power Co., and the gage at Reliance.



WEEKLY DURATION CURVES FOR HIWASSEE FRIER AT RELIANCE, TENN 1901-1923

MEAN WEEKLY DISCHARGE, IN SECOND-FEET,

						Year					1
Week	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910
1		2,677	4,557	3,107	929	1,670	5,933	5,203	6,041	2,771	2,193
2		11,287	2.711	2,461	846	5,804	3,366	3,277	6,436	2,290	2,761
3		3,721	2,513	1,830	1,276	2,517	2,843	2,937	4,224	5, 196	2,107
4		3,069	2,984	1,577	2,686	1,323	7,526	2,573	2,951	2,310	2,750
5		4,620	8,527	2,280	1,116	1,226	3,329	4,701	3,694	1,919	2,103
6		4,393	3,809	6,876	1.587	6,696	2,333	5,149	3,423	5,440	2,197
7		3,137	2,737	9,601	1,369	3,997	1,987	2,881	6,980	8,943	3,046
8		2,264	3,280	4,259	3,393	6,890	1,959	2,660	4,074	7,404	3,456
9		1,964	12,286	11,437	1,913	2,573	2,363	4,803	3,554	4,601	3,944
10		3,207	5,184	7,987	3,059	2,466	2,586	3,963	3,177	5,901	2,730
11		2,766	5,284	6,730	2,713	2,346	3,976	3,516	4,187	12,264	2,300
12		2,360	4.116	10,234	5,610	2,873	4,823	2,647	8,256	4,736	1,879
13		11,453	7,289	8,157	3,847	2,117	4.203	2,536	4,927	5,743	1,654
14		6.954	4.600	6,594	2,220	1,909	3,160	2,581	3,394	3,790	1,507
15		4,177	3,953	7.789	2.844	2,291	4,604	2,410	2,744	3,420	1,484
16		10,001	3,201	5,380	1.784	1,974	3,720	2,729	4,344	3,083	3,343
17		4,656	2,637	3.826	1.884	2,807	2,676	3,520	4,506	3,870	2,216
18		3,169	2,817	3,056	1,419	3,156	2,436	2,646	3,379	7,840	1,851
19		2,637	2,233	2,536	2,636	2,747	2,184	3,636	3,573	4,093	6,107
20		4,239	2,260	2,214	1,586	3,561	1,609	2,927	2,739	3,181	3,021
21		12,151	1,903	1,884	1,191	3,879	1,699	2,573	2,414	11,013	8,229
		4,293	1,617	3.486	1,364	2,284	1,801	3,474	2,221	4,519 9,623	3,411 4,547
23		3,326	1,571	4,837	1,300	1,529	1,976 3,689	3,297 2,621	2,656 2,020	4,870	4,076
25		4,149 3,370	1,443 1,426	2,807 1,941	936	1,309 1,963	2,270	2,021	1,603	3,889	3,030
26		3,237	1,420	2,323	1,013 1,240	1,743	2,393	2,203	1,271	4,269	3,127
27		2,607	1,303	1,827	929	1,676	1,610	1,956	2,390	3,639	4,353
28		1.970	1,563	3.074	1.024	2,824	3,530	2,591	2,194	5,000	3,883
29		2,089	1.177	2.044	762	1,961	7,894	2,071	1,461	2,826	3,006
30		1,689	941	1,397	973	1,229	3.844	1,537	1,209	2,989	2,620
31		1,511	1,050	1,957	987	1,026	4.426	2.859	1,219	2.881	2,617
32		4,566	847	1,477	1.794	1,660	2,916	1,467	1,609	2,396	3,640
33		13,364	793	1,426	1,413	1,900	2,506	2,563	994	2,301	2,263
34	1,233	13,219	746	1,181	1,015	1,571	3,240	2,109	2,030	1,604	2,006
35	1,220	5,520	981	907	924	1,129	4,923	1,394	1,317	1,449	2,267
36	1,036	3,286	893	842	858	1,017	3,323	1,243	1,616	1,379	2,129
37	2,749	2,749	993	888	583	870	2,961	1,403	941	1,449	1,569
38	1,566	4,386	1,046	938	513	755	4,160	1,733	802	1,734	1,256
39	1,113	2,506	1,347	694	486	640	5,201	2,730	736	1,629	1,354
40		2,039	1,067	590	446	925	10,226	1,844	699	1,116	1,224
41	1,289	1,964	1,143	944	413	1,302	4,196	1,470	1,026	1,354	1,396
42	1	1,757	1,091	1,011	389	878	3,807	1,243	774	3,057	1,083
43		1,549	884	631	391	843	2,844	1,329	1,329	1,264	1,039
44	1,501	1.506	884	779	438	815	2,314	1,269	1,437	1,210	1,085
45	1,463	1,463	1.070	931	541	788	2,050	1,706	1,040	1,129	1,033
46		1,534	1,029	1,231	570	720	2,437	1,714	1,113	1,124	988
47		1,509	1,290	1,024	618	854	15,583	3,863	900	1,180	968 1.187
48 49	4,204 3,299	1,400	2,393	756	704	935	3,446 3,060	2,597	2,371	1,083 2,077	4,513
50	1,833	1,571 9,516	2,923 1,529	735 821	1,657 842	6,276 3,811	3,000	1,704 3,424	4,511 2,586	2,764	1,534
51		3,087	3,213	1,009		2,960	5,009	2,711	2,753	1,760	1,323
52		11,504	2,114	1,009	756 1,869	3,216	5,933	4,050	2,751	2,113	1,694
1/4	2,500	11,004	2,114	1,040	1,509	3,210	0, 300	1,000	2,101	2,110	1,034

OF HIWASSEE RIVER AT RELIANCE, TENN.

						Year	,					
1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
7,489	3,330	2,424	993	2,360	4,136	4,479	1,084	7,620	1,327	2,759	1,886	4,049
2,349	2,424	2,533	781	2,493	3,927	2,871	2,661	3,276	1,756	4,581	3,776	1,960
1,811	1,981	2,736	684	3,207	3,559	5,110	2,750	3,117	2,746	4,274	10,329	2,026
1,703	1,509	5,321	770	3,846	4,264	4,873	3,349	5,167	7,486	2,819	9.987	5,240
2,036	4,629	4,069	1,106	4,250	8,157	5,869	9,761	3,307	4,451	2,804	3,396	4,841
5,497	1,937	2,810	1,624	3,596	4,310	3,417	3,066	2,660	3,897	12,674	3,754	6,221
3,423	3,363	4,837	1,374	3,091	2,851	3,359	4,080	4,051	2,527	6,304	6,650	6,334
2,601	4,789	2,920	1,850	3,007	2,514	11,271	4,197	4,744	3,889	5,337	3,810	2,924
2,531	5,934	6,529	1,320	2,836	3,276	14,350	2,524	4,230	2,606 3,479	3,580 2,883	6,044 8,446	3,013 4,414
2,233	3,614	2,779	1,201	3,259	3,067	13,173	2,513 2,034	8,201 4,337	5,307	2,494	7,070	7,146
1,866	6,184	14,057	2,173 1,497	2,459 2,277	2,291 1,960	6,097 13,894	2,049	3,347	5,603	2,420	5,350	5,096
2,021 3,093	4,586 11,061	5,130 12,074	2,026	2,277	2,493	12,459	1,686	4,101	7,429	3,003	6,061	3,350
7,257	4,974	3,923	1,864	2,200	2,495	8,174	2,064	2,870	21,151	2,779	5,089	3,343
7,560		3,249	2,620	1,881	2,006	5.731	2,576	3,099	5,847	2,060	4,043	4,901
5,289		2,809		1,423	1,800	3,951	2,447	3,599		5,164	5,321	3,777
3,321		2,367	2,097	1,360	1,594	3,824	2,361	2,451	4,560	3,576	4,140	3,359
2,789		2,007		1,331	1,424	3,583	2,609	2,860	3,677	2,694	6,270	3,236
2,231		2,001	1,549	3,430	1,276	2,919	2,597	3,459		2,880	5,097	3,129
1,946		1,843		1,914	1,301	2,339	2,810			2,836	3,576	5,126
2,150		4,439	950	1,521	5,700	2,204	3,096			3,139	3,309	4,406
1,569		-2,100	806	1,439	2,440	2,224	1,637	1,776		2,131	3,171	6,576
1,36	2,233	2,689	929	1,519	1,954	3,009	1,687	1,484		1,677	3,521	3,829
1,13	3,257	1,675		1,507	4,070	2,691	1,490			1,546	3,293 2,429	4,126 2,829
1,343		1,566		1,197	2,466	2,216	1,947			1,441 1,453	2,429	3,936
979		1,313		1,071	2,104	1,671	2,346 1,510	1		1,263		2,704
943		1,378		2,513	1,587	1,423	1,070			1,384		2,651
1,35				1,584	12,550 6,943		1,177			2,110		3,23
1,45		923	1	1,109 816	5,891	1,866	1,734			1,436		2,590
1,33		1		766	3.493		1,391			1,504		2,29
1,04				699	3,733	1	886			1,651	1,293	2,47
87		1			2,651		888	1,28	9 11,560	2,474	1,236	2,34
70				1,083	2,120		804	1,19	5,953			2,19
81					1,634		765	1,49				1,66
1.07				913	1,524	1,640	906					1,500
78		69.	5 478	829	1,401	1,167	786	1				
77	4 1,457	92	9 586	818			1,04				1	
68	4 1,913	71	8 485				888					91
60					1,089		701					87
90		1			988		677 730			1		1
2,53							2.54					
97			1	1		1	9,440					1
77		1					1,87		1			1,05
1.20							1,68		1			
1.57					1					2,36		
1,43					1							
93				1		1		6 2,61				
94							1					
1,5												
3.9		1				892	5,04	1 1,55	6 4,789	3,46	5 2,341	2,47

Monthly Discharge of Hiwassee River at Reliance, Tenn. [Drainage area, 1,180 square miles]

		Discharges i	n Second-fee	t		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1900						
September	7,640	870	1,610	1.36	1.52	
October -	9,300	870	1,540	1.31	1.51	
November	11,600	1,080	2,030	1.72	1.92	
December.	5,450	1,480	2,620	2.22	2.56	
1901	0,100	1,400	2,020	2.22	2.00	
January	30,800	1,800	5,010	4.25	4.90	
February	12,600	1,480	3,450	2.92	3.04	
March	34,600	1,800	4,590	3.89	4.48	
April	25,000	3,350	6,280	5.32	5.94	
May	37,500	2,170	5,470	4.64	5.35	
June	7,250	2,380	3,580	3.03	3.38	
July	3,620	1,480	2,110	1.79	2.06	
August	33,700	1,340	8,190	6.94	8.00	
September	8,450	2,380	3,350	2.84	3.17	
October	2,380	1,340	1,790	1.52	1.75	
November	1,980	1,340	1,490	1.26	1.41	
December	32,200	1,340	6,260	5.31	6.12	
The year	37,500	1,340	4,298	3.64	49.60	
1902						
January	6,870	2,170	3,320	2.81	3.24	
February	38,000	2,380	5,730	4.86	5.06	
March.	20,200	2,840	6,070	5.14	5.92	
April	6,140	2,380	3,630	3.08	3.44	
May	3,620	1,640	2,210	1.87	2.16	
June	1,980	1,200	1,490	1.26	1.41	
July	2,380	870	1,240	1.05	1.21	
August	1,200	700	875	.742	.86	
September	1,980	780	1,050	.890	.99	
October.	1,640	870	1,030	.873	1.01	
November	5,450 5,790	870 1,340	1,350 2,390	1.14	1.27 2.34	
The year	38,000	700	2,532	2.14	28.91	
1903						
January	6,500	1,550	2,200	1.87	2.16	
February	32,100	1,740	6,900	5.85	6.09	
March.	26,900	3,900	8,600	7.29	8.40	
April	14,500	3,090	5,860	4.97	5.55	
May	3,900	1,740	2,400	2.04	2.35	
June	7,640	1,740	3,200	2.72	3.03	
July	5,450	1,200	2,070	1.75	2.02	
August	2,840	885	1,390	1.18	1.36	
September	1,550	590	843	.714	.80	
October	2,370	590	789	.669	.77	
November	2.840	735	979	.830	.93	
December	1,550	590	893	.757	.87	
The year	32,100	590	3,010	2.55	34.33	

MONTHLY DISCHARGE OF HIWASSEE RIVER AT RELIANCE, TENN.—Continued

		Discharges in	Second-feet	,	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1904					
January	7,690	655	1,400	1.19	1.37
February	5,800	895	1,960	1.66	1.79
March	10,500	1,520	3,560	3.02	3.48
April	3,480	1,520	2,210	1.87	2.09
May	6,170	895	1,630	1.38	1.59
June	2,160	833	1,170	.992	1.11
July	1,440	550	930	.778	.91
August	3,780	770	1,280	1.08	1.24
September	1,260	460	625	.530	.59
October	460	380	412	.349	.40
November	895	420	562	.476	.53
December	4,090	655	1,280	1.08	1.24
The year	10,500	380	1,418	1.20	16.34
1905					
January	15,400	1,100	2,680	2.27	2.65
February	22,700	1,100	4,880	4.14	4.3
March	5,090	1,830	2,450	2.08	2.40
April	7,300	1,520	2,320	1.97	2.20
May	8,080	1,940	3,170	2.69	3.10
June	2,400	1,260	1,640	1.39	1.5
July	6,540	1,100	1,910	1.62	1.8
August	3,190	895	1,500	1.27	1.4
September	1,520	602	832	.705	.7
October	2,920	602	976	.827	.9.
November	1,100 15,400	712 962	803 3,840	.681 3.25	3.7
	22,700	602	2,250	1.91	25.7
The year					
January	21,200	1,940	4,810	4.08	4.7
February	3,330	1,720	2,200	1.86	1.9
March	9,280	1,720	3,680	3.12	3.6
April	7,880	2,400	3,580	3-03	3.3
May	3,480	1,260	1,940	1.64	
June	7,690	1,340	2,540	2.15 3.47	2.4
July	15,000	1,430	4,090	3.47	3.4
August	8,880	2,050	3,540	3.36	3.4
September	14,200	2,050	3,970	4.23	4.8
October	15,000	2,400	4,990	4.23	5.2
November	55,200	1,940	5,580	3.53	4.0
December	10,100	2,650	4,160		
The year	55,200	1,260	3,757	3.18	43.3

MONTHLY DISCHARGE OF HIWASSEE RIVER AT RELIANCE, TENN.—Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907					
January	8,080	2,340	3,390	2.87	3.31
February	11,700	2,570	4,000	3.39	3.53
March	7,690	2,230	3,470	2.94	3.39
April	5,300	2,120	2,830	2.40	2.68
May	4,510	2,120	2,870	2.43	2.80
June	6,000	2,120	2,920	2.47	2.70
July	8,880	1,380	2,290	1.94	2.24
August	4,510	1,300	1,890	1.60	1.84
September	5,820	1,000	1,740	1.47	1.64
October	2,340	1,140	1,440	1.22	1.41
November	10,900	1,140	2,350	1.99	2.22
December	8,480	1,550	2,950	2.50	2.88
The year	11,700	1,000	2,678	2.27	30.70
1908					
January	15,000	2,640	4,710	3.99	4.60
February	12,100	2,870	4,600	3.90	4.21
March.	24,400	2,870	4,970	4.21	4.8
April	9,280	2,500	3,740	3.17	3.54
May	4,770	2,260	2,920	2.47	2.88
June	3,840	1,190	1,920	1 63	1.85
July	3,990	1,040	1,770	1.50	1.73
August	3,000	890	1,450	1.23	1.45
September	3,840	690	1,020	.864	.91
October	3,140	690	1,050	.890	1.03
November	1,360 11,300	820 1,270	1,000 3,330	.847 2.82	3.2
December	11,000				0.20
The year	24,400	690	2,707	2.29	31.20
January	11,100	1,890	3,030	2.57	2.90
February	27,000	1,700	6,300	5.34	5.50
March	36,500	3,300	6.830	5.79	6.68
April	5,310	2,840	3,600	3.05	3.40
May	25,000	2,950	6,340	5.37	6.19
June	22,500	3,420	5,630	4.77	5.35
July	8,000	2,080	3,510	2.97	3.45
August	4,170	1,360	2,180	1.85	2.13
September	3,660	1,210	1,540	1.31	1.4
October	8,000	998	1,650	1.40	1.61
November	1,360	1,060	1,140	.966	1.08
December	5,940	998	2,100	1.78	2.0
The year	36.500	998	3,654	3.10	41.86

MONTHLY DISCHARGE OF HIWASSEE RIVER AT RELIANCE, TENN.—Continued

ALTERNATION TO THE REAL PROPERTY.		Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1910					
January	4,720	1,700	2,430	2.06	2.38
February	8,370	1,890	2,730	2.31	2.40
March	6,270	1,530	2,540	2.15	2.48
April	5,620	1,360	2,120	1.80	2.01
May	11,600	1,700	4,750	4.03	4.65
June	8,740	2,400	3,650	3.09	3.45
July	5,940	2,290	3,430	2.91	3.36
August	6,270	1,620	2,470	2.09	2.41
September	5,310	1,210	1,770	1.50	1.67
October	1,620	998	1,180	1.00	1.15
November	1,530	930	1,040	.881	.98
December	18,500	930	2,170	1.84	2.12
The year	18,500	930	2,523	2.14	29.06
1911		4 000	0.000	2.73	3.15
January	17,500	1,620	3,220	2.73	2.99
February	12,900	1,800	3,390 2,330	1.97	2.27
March	4,170	1,700	5,680	4.81	5.37
April	17,500	2,080	2,170	1.84	2.12
May	2,950	1,530 930	1,240	1.05	1.17
June	1,890	805	1,240	1.05	1.21
July	1,990 1,360	638	889	.753	.87
August		638	844	.715	.80
September	2,290 9,510	538	1,210	1.03	1.19
October	2,500	690	1,280	1.08	1.20
November December	7,290	868	1,850	1.57	1.81
The year	17,500	538	2,112	1.79	24.15
1912	*** ***	1 000	2,750	2.33	2.69
January	11,600	1,360	3,960	3.36	3.62
February	12,000	1,700	6,020	5.10	5.88
March	33,000	3,180	4,760	4.03	4.50
April	9,120	3,060 1,620	3,300	2.80	3.23
May	7,290	1,620	2,580	2.19	2.44
June	4,720	1,530	2,800	2.37	2.73
July	4,440 2,610	1,140	1,600	1.36	1.57
August	3,910	868	1,330	1.13	1.26
September	5,310	930	1,370	1.16	1.34
October	2,720	998	1,200	1.02	1.14
November	3,910	998	1,640	1.39	1.60
The year	33,000	868	2,776	2.35	32.00
				1	

MONTHLY DISCHARGE OF HIWASSEE RIVER AT RELIANCE, TENN.—Continued

		Discharges in	Second-fee	t		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1913						
January	8,740	1,890	3,410	2.89	3.33	
February	14,700	2,400	4,100	3.47	3.61	
March	29,500	2,290	8,050	6.82	7.86	
April	7,290	2,190	3,200	2.71	3.02	
May	11,100	1,620	2,540	2.15	2.48	
June	4,720	930	1,830	1.55	1.73	
July	2,720	690	1,220	1.03	1.19	
August	1,620	690	1,030	.873	1.01	
September	1,700	638	750	.636	.71	
October	1,530	538	783	.664	.77	
November	1,060	638	752	.637	.71	
December	1,360	748	961	.814	.94	
The year	29,500	538	2,386	2.02	27.36	
1914	4 000		005	200	70	
January	1,290	638	805	.682	.79	
February	2,840	930	1,550	1.31	1.36	
March	3,420	1,140	1,630		1.59	
April	6,940	1,450	2,650	2.25	2.51	
May	2,290	805	1,280 794	1.08	1.24	
June	1,450 2,500	538	794	.669	.75	
JulyAugust	1,530	445	751	.636	.73	
September	998	490	512	.434	.48	
October	8,740	400	1,070	.907	1.05	
November	10,300	585	1,190	1.01	1.13	
December	19,500	1,450	4,680	3.97	4.58	
The year	19,500	400	1,475	1.25	16.98	
January	5,310	1,530	2,920	2.47	2.85	
February	6,940	2,400	3,550	3.01	3.13	
March	4,170	1,890	2,570	2.18	2.51	
April	2,400	1,360	1,690	1.43	1.60	
May	7,290	1,210	1,980	1.68	1.94	
June	2,500	805	1,350	1.14	1.27	
July	5,940	690	1,450	1.23	1.42	
August	2,840	638	908	.769	.89	
September	1,530	538	798	.676	.75	
October	8,370	998	1,900	1.61	1.86	
November	2,290	805	1,240	1.05	1.17	
December	35,500	868	4,850	4.11	4.74	
The year	35,500	538	2,101	1.78	24.13	

MONTHLY DISCHARGE OF HIWASSEE RIVER AT RELIANCE, TENN.—Continued

	,				
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1010					
1916	6,600	2,720	3,870	3.28	3.78
JanuaryFebruary	20,000	2,720	4,340	3.68	3.78
March	5,310	1,800	2,680	2.27	2.62
April	2,290	1,450	1,860	1.58	1.76
May.		1,060	2,500	2.12	2.44
June	7,640	1,620	2,630	2.12	2.49
July	26,500	1,360	6.360	5.39	6.21
August	4,440	1,530	2,760	2.34	2.70
September		998	1,370	1.16	1.29
October		930	1,150	.975	1.12
November	2,840	930	1,320	1.12	1.25
December	6,940	1,290	1,990	1.69	1.95
The year	26,500	930	2,736	2.32	31.58
1917					
January		2,080	4,300	3.64	4.20
February	23,500	2,500	6,100	5.17	5.38
March		5,010	12,800	10.8	12.45
April	11,600	3,300	5,440	4.61	5.14
May	4,170	1,890	2,620	2.22	2.56
June	6,270	1,530	2,430	2.06	2.30
July	5,010	1,060	1,640	1.39	1.60
August	2,400	805	1,410	1.19	1.37
September	5,620	748	1,630	1.38	1.54
October	1,700	805	1,080	.915	1.05
November	1,290	805	954	.808	.90
December	1,210	748	961	.814	.94
The year	35,500	748	3,447	2.92	39.43
1918	17,500	930	3,740	3.17	3.66
January	11,100	2,400	3,900	3.31	3.45
February	2,610	1,450	2,070	1.75	2.02
March	3,910	1,530	2,350	1.99	2.25
April	5,010	1,450	2,630	2.33	2.57
May	2,720	1,210	1,730	1.47	1.64
June	5,310	868	1,530	1.30	1.50
July	1,620	690	902	.764	.88
September	1,890	585	891	.755	.84
October	33,000	638	2,670	2.26	2.61
November	5,940	1,360	2,120	1.80	2.01
December	33,000	1,360	4,850	4.11	4.74
	33,000	585	2,449	2.08	28.14

MONTHLY DISCHARGE OF HIWASSEE RIVER AT RELIANCE, TENN.—Continued

		Discharges i	in Second-fee	et	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1010					
1919 January	13,300	2,610	4,690	3.97	4.58
February	- 7,710	2,400	3,820	3.24	3.37
March	13,600	2,770	4,890	4.14	4.77
April	4,660	2,290	3,000	2.54	2.83
May	5,620	1,800	2,630	2.23	2.57
June	5, 160	1,290	2,110	1.79	2.00
July	4,780	1,290	2,110	1.92	2.00
August	2,460	905	1,380	1.17	1.35
September	1,450	638	849	.719	.802
October	8,180	585	1,380	1.17	1.35
November	1,740	930	1,120	.95	1.06
December	17,600	1,090	2,950	2.50	2.88
The year	17,600	585	2,591	2.20	29.77
1920	12,400	1,210	3,460	2.93	3.38
JanuaryFebruary	7,460	2,080	3,480	2.95	3.18
March.	17,300	2,080	4,990	4.23	4.88
April	55,400	3,960	8,930	7.57	8.45
May	4,300	2,330	3,170	2.69	3.10
June	3,910	1,530	2,230	1.89	2.11
July	7,460	1,360	2,250	1.82	2.11
August	16,300	1,210	5,690	4.82	5.56
September.	7,360	1,700	2,860	2.42	2.70
October	1,700	1,140	1,370	1.16	1.34
November	2,500	1,060	1,420	1.20	1.34
December	24,200	1,530	4,720	4.00	4.61
The year	55,400	1,060	3,706	3.14	42.75
1921	7,360	2,330	3,550	3.01	3.47
January					
March	31,500	2,500 2,080	6,870	5.82 2.33	6.06
	3,780		2,750	2.33	3.20
April	9,120 5,620	1,800 1,930	3,390 2,810	2.38	2.74
May					1.48
June	2,190	1,290	1,570	1.33	1.48
July	2,400 3,860	1,060 1,150	1,570 1,720	1.33	1.68
August September	2,590	880	1,720	.932	1.08
October	2,080	759	1,100	.848	.98
November	7,410	824	2,250	1.91	2.13
December	7,410	1,330	2,590	2.19	2.53
The year	31,500	759	2,598	2.20	29.53

MONTHLY DISCHARGE OF HIWASSEE RIVER AT RELIANCE, TENN.-Continued

		Discharges in	Second-feet	;		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1922						
January	29,400	1,770	6,220	5.27	6.08	
February	13,800	3,110	4,390	3.72	3.87	
March.	20,000	3,860	6,850	5.81	6.70	
April	8,000	3,480	4,760	4.03	4.50	
May	12,300	2,630	4,350	3.69	4.25	
June	6,540	1,880	2,920	2.47	2.76	
July	2,750	1,430	2,030	1.72	1.98	
August	1,880	904	1,190	1.01	1.16	
September	2,630	792	988	.837	.93	
October	1,920	704	844	.715	.82	
November	992	718	764	.647	.72	
December	21,700	746	4,080	3.46	3.99	
The year	29,400	704	3,282	2.78	37.76	
1923						
January	12,300	1,700	3,400	2.88	3.32	
February	11,000	2,510	4,990	4.23	4.40	
March	13,500	2,630	4,790	4.06	4.68	
April	11,000	2,790	3,820	3.24	3.62	
May	9,520	2 670	4,430	3.75	4.32	
June	6,990	2,550	3,860	3.27	3.65	
July	5,780	1,770	2,790	2.36	2.72	
August	3,920	1,580	2,220	1.88	2.17	
September	1,770	1,020	1,280	1.08	1.20	
October	1,100	860	918	.778	.90	
November	1,520	822	998	.846	.94	
December	4,110	1,030	2,000	1.69	1.95	
The year	13,500	822	2,958	2.51	33.87	

SHOOTING CREEK NEAR HAYESVILLE, N. C.

At steel highway bridge on new road being built from Hayesville to Franklin, N. C., 100 feet downstream from new concrete highway bridge, 5 miles from Hiwassee River and 71/2 miles southeast of Hayesville, Clay County. Drainage Area. 37.9 square miles (measured on topographic maps).

RECORDS AVAILABLE. August 15, 1922 to December 31, 1923.

GAGE. Chain gage attached to upstream handrail of bridge; read by Mrs. Lena Kitchens.

DISCHARGE MEASUREMENTS. Made from downstream side of bridge to which

gage is attached. CHANNEL AND CONTROL. Bed of stream composed of gravel and sand; probably shifting. Left bank is high, rocky and not subject to overflow. Right bank is fairly high and rarely subject to overflow. Control is a gravel and boulder

is fairly high and rarely subject to overflow. Control is a gravel and bodder shoal 75 feet below gage; probably permanent.

EXTREMES OF DISCHARGE. 1922-1923: Maximum stage recorded, 6.80 feet, morning reading December 17, 1922 (discharge, 2,380 second-feet); minimum stage recorded, 1.72 feet, evening reading October 5, 1922 (discharge, 20 second-feet).

ICE. Stage-discharge relation probably never affected by ice.

REGULATION. Probably negligible.

ACCURACY. Stage-discharge relation permanent. Rating curve is well defined between 40 and 300 second-feet and is an extension above. Gage read to buydred the twice daily. Daily discharge ascertained by applying mean daily hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF SHOOTING CREEK NEAR HAYESVILLE, N. C.

	Ye	ar		Ye	ar
Week			Week		
	1922	1923		1922	1923
1		172	27		98
2		88	28		99
3		101	29		115
4		191	30		96
5		204	31		69
6		226	32		151
7		290	33		73
8		129	34	39	64
9		136	35	33	61
10		153	36	34	49
11		268	37	58	38
12		201	38	36	52
13		130	39	27	31
14		127	40	28	27
15		173	41	29	24
16		141	42	26	31
17		124	43	29	27
18		112	44	24	35
19		110	45	25	33
20		164	46	28	43
21		151	47	39	28
22		271	48	58	37
23		157	49	125	83
24		149	50	198	75
25		128	51	368	83
26		117	52	116	119

Monthly Discharge of Shooting Creek Near Hayesville, N. C. [Drainage area, 37.9 square miles]

		Discharges i	n Second-fee	t		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches	
1922						
August 15-31	52	31	39.1	1.03	0.65	
September		25	38.4	1.01	1.13	
October	54	21	27.8	0.734	.85	
November	88	24	29.2	.770	.86	
December.	1,470	27	195	5.15	5.94	
1923						
January	329	79	141	3.72	4.29	
February	745	117	211	5.57	5.80	
March		113	182	4.80	5.53	
April	314	106	140	3.69	4.12	
May	446	98	159	4.20	4.84	
June	243	98	146	3.85	4.30	
July	184	65	100	2.64	3.04	
August	329	51	86.5	2.28	2.63	
September	142	28	42.8	1.13	1.26	
October	58	23	28.2	.744	.86	
November	78	27	35.0	.923	1.03	
December	218	38	87.9	2.32	2.68	
The year	745	23	113.3	2.99	40.38	

TUSQUITEE CREEK NEAR HAYESVILLE, N. C.

LOCATION. At wagon bridge, 2½ miles above the mouth of the creek and 3 miles northeast of Hayesville, Clay County.

Drainage Area. 40 square miles. Records Available. May 20, 1907 to December 31, 1909, when station was discontinued.

GAGE. Vertical staff attached to left bank bridge abutment; read by T. C. Moore. DISCHARGE MEASUREMENTS. Made from the bridge.

CHANNEL AND CONTROL. Rocky, rough and fairly permanent. Control not

Extremes of Discharge. Maximum stage recorded, 5.0 feet March 13, 1909 (discharge, 938 second-feet); minimum stage, 1.0 foot October 2 to 8 and 19 to 22 and November 27 to 30, 1908 (discharge, 30 second-feet).

ICE. Stage-discharge relation probably not affected by ice.

REGULATION. Probably none.

ACCURACY. Stage-discharge relation fairly permanent. Rating curves well defined for medium stages, fairly well defined for low water and extended to high water. Gage probably read to half-tenths once a day. Daily discharge ascertained by applying daily gage height to rating table. Records fair except for high water which may be badly in error.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF TUSQUITEE CREEK NEAR HAYESVILLE, N. C.

		Year			Year			
Week	1907	1908	1909	Week	1907	1908	1909	
		1000	1000			1000		
1		212	142	27	75	98	13	
2		188	98	28	105	102	16	
3	and the second second second	163	245	29	99	76	11	
4		137	103	30	148	65	10	
5		132	77	31	104	47	11	
6		126	198	32	74	66	8	
7		234	294	33	122	51	7	
_		147	320	34	151	114	6	
9		134	222	35	81	70	5	
0		147	210	36	67	63	4	
1		175	460	37	69	46		
2		380	222	38	153	39	6	
3		193	255	39	147	40	â	
4		136	161	40	97	31	3	
5		122	141	41	68	43	7	
3		157	119	42	51	34	6	
7		226	195	43	64	50	4	
8		146	261	44	87	53	3	
9		167	149	45	106	43	4	
0		140	158	46	97	56	4	
	107	130	367	47	146	39	4	
2	239	231	200	48	116	93	3	
3	159	142	338	49	78	250	11	
1	117	112	168	50	182	137		
5	99	81	184	5!	106	133	(
6	93	67	123	52	185	136	7	

MONTHLY DISCHARGE OF TUSQUITEE CREEK NEAR HAYESVILLE, N. C. [Drainage area, 40 square miles]

		Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1907					
June	468	83	139	3.48	3.8
July	590	68	110	2.75	3.1
August	215	60	106	2.65	3.0
September	422	46	106	2.65	2.9
October	120	46	69	1.73	1.9
November	255	53	117	2.93	3.2
December	467	76	136	3.40	3.9
1908			100	0.10	
January	280	111	169	4.23	4.8
February	407	111	160	4.00	4.3
March	685	120	215	5.38	6.2
April	496	102	161	4.03	4.5
May	636	102	165	4.13	4.7
June	202	60	105	2.63	2.9
July	190	53	82	2.05	2.3
August	160	40	71	1.78	2.0
September	102	35	48	1.20	1.3
October	102	30	42	1.05	1.2
November	84	30	43	1.08	1.2
December	775	68	169	4.23	4.8
The year	775	30	119	2.98	40.6
1909					
January	408	84	141	3.53	4.0
February	468	64	246	6.15	6.4
March	938	138	274	6.85	7.9
April	351	99	162	4.05	4.5
May	465	108	222	5.55	6.4
June	715	117	210	5.25	5.8
July	255	70	126	3.15	3.6
August	215	52	80	2.00	2.3
September	117	41	53	1.33	1.4
October	295	36	55	1.38	1.5
November	92	36	43	1.08	1.2
December	408	36	78	1.95	2.2
The year	938	36	141	3.52	47.6

VALLEY RIVER AT TOMOTLA, N. C.

LOCATION. At steel highway bridge 600 feet from Tomotla postoffice, Cherokee County, on Southern Railway 5 miles northeast of Murphy, half a mile upstream from Rodgers Creek, and 1 mile downstream from Colvards Creek.

Drainage Area. 103 square miles (measured on topographic map).

RECORDS AVAILABLE. June 29, 1904 to December 31, 1909; January 21, 1914 to April 30, 1917; October 29, 1918 to December 31, 1923.

GAGE. In two sections; lower section, 0.0 to 5.4 feet, is on a sloping timber which is bolted to marble bedrock; upper section, 5.4 to 10.0 feet, is a vertical rod bolted to a timber on old bridge pier. The lower section is the same gage which was in use when station was discontinued in 1909. Both sections repaired in 1918; gage datum unchanged. Gage read by J. T. Hayes.

DISCHARGE MEASUREMENTS. Made from single-span steel highway bridge

CHANNEL AND CONTROL. Bed of channel composed of gravel which remains permanent for ordinary stages but shifts during big floods. Control is at a rock ledge just below bridge. Formation of gravel bars changes control oc-

EXTREMES OF DISCHARGE. 1904-1909, 1914-1917, and 1918-1923: Maximum stage recorded, 17.3 feet November 19, 1906 (discharge 7,780 second-feet; discharge previously published is in error); minimum discharge, 22 second-feet October 28 to November 2, 1904.

ICE. Stage-discharge relation not affected by ice.

DIVERSIONS. None. REGULATION. Negligible.

Accuracy. Stage-discharge relation not permanent as floods cause changes in gravel bars at the control; fairly permanent between shifts. Rating curves usually well defined for medium and low stages and extended above. Gage read to terths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for extremely low and high stages for which they are fair.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF VALLEY RIVER AT TOMOTLA, N. C.

								Ye	ar							
Week	1904	1905	1906	1907	1908	1909	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
1		153	649	624	552	291		336	445	588		758	140	293	269	503
2		635	351	446	534	223		291	535	352		299	250	498	573	211
3		230	377	429	414	506		361	446	610		296	414	440	-,	262
4		104	731	433	298	227	109	559	441	623		457		472	983	699
6		106 787	356 266	519 704	386 329	145 593	109 360	614 357	736 428	801 386		295 231	526 337	298 1,079	426 471	739 769
7		547	209	347	659	1,084	313	279	320	406		351	245	602	747	997
8		1,011	238	294	369	811	489	288	261	1,163		488	421	519	447	341
9		308	321	621	336	501	213	324		2,226		414	298	369	783	337
10		324	300	639	364	610	204	389	357			737	340	259	995	525
11		275	447	475	389	1,103	356	226	269	659		387	664	213	794	969
12		386	466	296	848	449	195	204	212			248	678	237	579	621
13		275	499	278	437	618	367	204	286			293	746	281	744	372
14		219	376	313	298	354	305	190	243	693		205	1,885	240	555	403
16		285 227	592 354	270 270	252 411	288 245	292 487	197 140	232 196	501 327		286 321	578 446	177 524	371 612	549 424
17		277	306	437	428	274	243	141	175	275		188	494	384	441	324
18		337	285	266	296	499	195	124	151	210		271	384	274	778	273
19		246	245	388	338	301	201	298	122			326	328	385	534	300
20		349	184	308	235	279	130	155	114			203	286	348	320	518
21		288	150	260	219	902	99	114	372			170	225	263	258	371
22		197	182	435	183	387	80	116	177			141	179	193	234	511
23		128	125	254	193	747	91	96	167			109	171	162	292	312
24		104	498	279	166	352	78	137	434			98	125	137	398	400
25		126	378	239	166	319	80	91	259			110	219	123	516	214
26		276	256	279	112	351	72	83 242	178			348 178	131	145	187	266
28	60 68	216 849	207 438	192 255	191 197	415 384	69 71	160	151 449			138	163 146	109 184	241 188	248 161
29	64	283	659	185	122	223	169	123	449			149	450	183	189	168
30	70	162	366	180	108	251	62	75	443			114	185	165	141	195
31	72	116	423	201	105	195	64	72	266			90	123	169	99	147
32	94	197	315	118	137	188	99	68	244			105	474	279	92	187
33	248	375	269	179	89	219	105	72	203			86	1,207	305	91	156
34	125	231	334	205	189	152	84	76	144			82	507	194	92	136
35	86	138	349	129	125	118	91	81	121			87	292	158	86	113
36	69	108	331	127	121	102	59	74	109			69	284	119	80	102
37	53 48	87 75	203 414	105 242	58 58	138 383	55 50	108	91 91			57 53	536 289	100 87	85 97	79 77
39	44	66	581	211	58	217	56	69	90			43	199	167	69	72
40	44	87	809	161	58	89	68	203	75			51	147	129	65	58
41	36	152	454	128	73	193	62	83	72			79	122	84	76	52
42	27	74	355	101	58	158	289	106	89			101	106	76	65	56
43	26	108	251	109	99	99	82	177	75			321	112	70	76	54
44	28	67	205	119	82	86	65	91	90		570	113	116	193	59	73
45	48	72	168	217	72	86	101	74	81		145	92	103	117	61	63
46	49	62	342	* 197	94	86	81	188	148		139	106	181	357	76	56
47	55	99	1,878	408	72	92	149	170	151		150	86	135	357	69	78
48	138 240	136 909	427 351	239 199	99 576	86 262	148 598	118 95	176 167		227 139	141 304	143 216	721 478	129 377	85 168
50	136	390	421	317	204	300	224	135	177		308	557	733	217	530	140
51	91	545	665	279	214	156	174	704	170		826	274	485	235	803	152
52	243	397	685	508	222	144	989	792	403	1,000,000	467	159	530	598	242	256
														1		1

Monthly Discharge of Valley River at Tomotla, N. C. [Drainage area, 106 square miles]

		Discharges in	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1904					
July	126	. 50	65.6	0.619	0.71
August	1,000	72	133	1.25	1.44
September	72	44	55.2	.521	.58
October	44	22	32.9	.31	.36
November	357	22	59.5	.56	.63
December	452	88	181	1.71	1.97
1905					
January	2,430	66	262	2.47	2.85
February	2,610	100	642	6.06	6.31
March	740	205	312	2.94	3.39
April	672	192	265	2.50	2.79
May	672	192	281	2.65	3.06
June	550	91	154	1.45	1.62
July	3,430	138	361	3.41	3.93
August	672	100	221	2.08	2.40
September	138	50	86.4	.815	.91
October	432	58	102	.962	1.11
November	192	58	85.2	.801	.90
December	2,560	128	502	4.74	5.46
The year	3,430	50	272.8	2.57	34.73
1906 January	1,590	242	514	4.85	5.59
February	360	192	250	2.36	2.46
March	880	242	425	4.01	4.62
April.	1,180	285	403	3.80	4.24
May	375	134	204	1.92	2.21
June	1,100	102	310	2.92	3.26
July	1,260	156	395	3.73	4.30
August	672	217	322	3.04	3.50
September	1,340	156	373	3.52	3.93
October	1,760	205	442	4.17	4.81
November	7,780	156	663	6.25	6.97
December	990	285	521	4.92	5.67
The year	7,780	102	402	3.79	51.56
1907		200	109	4.56	5.26
January	808	382	483	4.24	4.42
February	990	266	449	4.24	5.22
March	952	225	480		3.38
April	604	212	321	3.03	3.33
May	774	212	306	2.89	3.12
June	740	212	297	2.80	2.29
July	472	140	211	1.99	1.74
August	308	102	160	1.51	
September	952	86	168	1.58	1.76
October	212	86	123	1.16	1.34
November	774	102	253	2.39	2.67
December	1,500	140	323	3.05	3.52
The year	1,500	86	298	2.81	38.05

MONTHLY DISCHARGE OF VALLEY RIVER AT TOMOTLA, N. C .- Continued

			Discharges in	Second-fee	t	
	Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
	1908					
January		952	252	432	4.08	4.70
		1.710	294	437	4.12	4.44
March		1,500	294	495	4.67	5.38
April		706	212	347	3.27	3.65
May		536	186	259	2.44	2.81
June		280	102	162	1.53	1.71
July		352	102	150	1.42	1.64
August		308	72	133	1.25	1.44
September		225	58	75.6	.713	0.80
October		140	58	73.9	.697	.80
November		130	72	78.1	.737	.82
December		1,890	86	285	2.69	3.10
The yea	r.,	1,890	58	244	2.30	31.29
T	1909	916	151	299	2.82	2 05
			120		6.58	3,25 6,85
		2,110	294	697 676		
		2,520 952	294	316	6.38	7.36
			212	463	4.37	5.04
		1,710	266	452	4.37	4.75
		1,540 880	186	308	2.91	3.36
		266	120	178	1.68	1.94
		880	86	203	1.92	2.14
		442	72	130	1.92	1.42
			86	87.4	.825	.92
		111				
December		672	86	205	1.93	2.22
The yea	1914	2,520	72	335	3.16	42.57
January.	1011	140	78	104	0.981	0.47
		970	92	332	3,13	3.26
		690	166	259	2.44	2.81
		830	157	334	3.15	3.51
		349	78	147	1.39	1.60
		140	54	81.1	.765	.85
		290	54	89.9	.848	.98
		235	54	91.6	.864	1.00
-		72	45	55.7	.525	.59
		830	45	120	1.13	1.30
		257	65	93.3	.880	.98
		3,200	148	492	4.64	5.35
The yea	r	3,200	45	183	1.73	22.70

MONTHLY DISCHARGE OF VALLEY RIVER AT TOMOTLA, N. C.—Continued

Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1915		222	000	0.07	4 0
January	970	226 226	389 381	3.67	4.23 3.8
February	1,160	179	270	2.55	2.9
March	760 327	116	168	1.58	1.70
April	620	98	165	1.56	1.8
May		68	105	.991	1.1
June	314	68	143	1.35	1.5
July	725	56	73.7	.695	.8
August	136	46	78.3	.739	8.
September	400	68		1.30	1.5
October	498		138 133	1.25	1.4
November	415	68 82	422	3.98	4.5
December	3,200	8,2	422	0.90	4.0
The year	3,200	46	206	1.94	26.3
1916 January	1,040	325	458	4.32	4.9
February	2,130	225	423	3.99	4.3
March		175	304	2.87	3.8
April	275	155	210	1.98	2.3
May	795	95	191	1.80	2.
June	760	135	252	2.38	2.
July	655	115	362	3.42	3.
August	325	115	192	1.81	2.
September	175	60	97.8	.923	1.0
October	165	60	81.4	.768	
November	385	75	128	1.21	1.
December	1,000	135	231	2.18	2.
The year	2,130	60	244	2.30	31.3
1917	1,360	225	541	5.10	5.
January	2,490	250	740	6.98	7.
March				4.23	4.
April	1,000	250	448	4.20	
October 29-31	1,160	798	964	9.10	1.
November	424	106	178	1.68	1.
December	3,250	122	395	3.73	4.
1919	1,640	220	441	4.16	4.
January	734	209	355	3.35	3.
February	1,000	220	417	3.93	4.
March	559	140	247	2.33	2.
April	514	140	231	2.18	2.
May	484	91	162	1.53	1.
June	266	91	143	1.35	1.
July	242	64	90.5	.854	
August	84	40	57.3	.541	
September	544	34	135	1.27	1.
October	220	77	104	.981	1.
November	1,440	119	307	2.90	3.
December	1,640	34	224	2.12	28.

Monthly Discharge of Valley River at Tomotla, N. C.—Continued

		Discharges i	in Second-fee	et	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1920					
January	2,260	122	487	4.59	5.29
February	768	182	354	3.15	3.40
March	1,350	232	557	5.25	6.05
April	4,910	384	832	7.85	8.76
May.	448	182	288	2.72	3.14
June	368	119	163	1.54	1.72
July	905	122	226	2.13	2.46
August	2,030	106	563	5.31	6.12
September	1,230	160	322	3.04	3.39
October	202	94	119	1.12	1.29
November	438	94	139	1.31	1.46
December	2,750	134	470	4.43	5.11
The year	4,910	94	377	3.55	48.19
1921					
January	948	236	373	3.52	4.06
February	3,050	248	635	5.99	6.24
March	408	160	256	2.42	2.79
April	1,100	160	331	3.12	3.48
May	770	191	303	2.86	3.30
June	248	109	146	1.38	1.54
July	298	102	161	1.52	1.75
August	600	117	228	2.15	2.48
September	324	74	120	1.13	1.26
October	248	67	94.1	.888	1.02
November	1,250	94	351	3.31	3.69
December	1,490	170	406	3.83	4.42
The year	3,050	67	284	2.68	36.03
January	4,550	236	786	7.42	8.55
February	1,540	378	523	4.93	5.13
March	2,120	408	806	7.60	8.76
April	948	298	510	4.81	5.37
May	1,490	224	442	4.17	4.81
June	1,250	151	275	2.59	2.89
July	350	109	184	1.74	2.01
August	116	80	92.1	.869	1.00
September	197	65	82.3	.776	.87
October	121	56	69.4	.655	.76
November	116	56	67.3	.635	.70
December	2,700	. 68	467	4.41	5.08
The year	4,550	56	359	3.38	41.41

MONTHLY DISCHARGE OF VALLEY RIVER AT TOMOTLA, N. C.—Continued

		Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1923					
January	1,540	185	435	4.10	4.73
February	2,620	280	688	6.49	6.76
March	1,290	280	591	5.58	6.43
April	984	294	417	3.93	4.38
May	876	230	396	3.74	4.31
June	556	185	312	2.94	3.28
July	456	120	192	1.81	2.09
August	280	102	150	1.42	1.64
September	114	62	84	.792	.88
October	84	48	56.2	.530	.61
November		51	71	.670	.75
December	8 -	71	175	1.65	1.90
The year	2,620	48	297	2.80	37.76

NOTTELY RIVER NEAR RANGER, N. C.

Location. At highway bridge half a mile below Ranger, Cherokee County, and a fourth of a mile below Louisville and Nashville Railroad bridge. It is 8 miles above mouth of the river.

Drainage Area. 272 square miles (measured on topographic maps). Records Available. January 17, 1901 to December 31, 1905; January 22, 1914 to April 30, 1917; October 20, 1918 to December 31, 1923.

GAGE. Chain gage attached to downstream side of steel highway bridge; installed October 28, 1918; read by A. D. Kilpatrick. Gage used in 1901-1905, was a vertical staff fastened to a pier of old wooden bridge at same site; that used from January 22, 1914 to April 30, 1917, and October 20-27, 1918, was vertical staff fastened to tree on left bank 75 feet above bridge. Datum of gages unchanged.

DISCHARGE MEASUREMENTS. Made from highway bridge.

CHANNEL AND CONTROL. Channel straight for 50 feet above and below gage. Bed composed of gravel, sand and boulders; practically permanent. Right bank high and not subject to overflow; left bank is overflowed at stages above 18 feet. Control is rock riffle 300 feet downstream and probably permanent.

Extremes of Discharge. Maximum stage recorded, 21.0 feet February 23, 1902 (discharge, from logarithmic extension of rating curve, 9,800 second-feet); minimum stage, 2.1 feet July 2, 3, August 9, September 9-11, 14-16, 29, 30, October 1-4, 1914 (discharge, 89 second-feet).

ICE. Stage-discharge relation not affected by ice.

REGULATION. Operation of small mills may cause slight diurnal fluctuations, but probably not enough to affect accuracy of results, except possibly at extremely low water.

Accuracy. Stage-discharge relation not permanent. Six rating curves used with dates and definition as follows: February 16, 1901 to December 31, 1905, well defined below 2,500 second-feet and extended above logarithmicly; January 22 to September 30, 1924, fairly well defined between 125 and 650 second-feet; October 1, 1914 to April 30, 1917, fairly well defined between 125 and 800 second-feet and extended beyond; October 20, 1918 to September 30, 1920, fairly well defined between 150 and 2,200 second-feet and extended above; October 1, 1920 to December 17, 1922, well defined below 2,500 second-feet and extended above; December 18 to 31, 1923 well defined for same limit. Gage probably read to tenths once daily with few exceptions when it was read twice daily. Daily discharge ascertained by applying gage height to rating table. Records for 1901-1905, good below 2,500 second-feet; for 1914-1917, fair below 1,000 secondfeet; for 1918-1920, good below 2,500 second-feet and fair above; for 1921-1923 records good.

Note. Water level above top of gage October 15, November 30, December 4, 25, 1914; December 18, 29, 1915; February 20, July 9-12, 1916; February 20, March 1, 4, 5, 24, and 27, 1917; discharge estimated from notes made by observer.

MEAN WEEKLY DISCHARGE, IN SECOND-FEET, OF NOTTELY RIVER AT RANGER, N. C.

						SECONI		Year	OTTE		VER AI				
Week	1901	1902	1903	1904	1905	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
								-							
1		816	418	216	303		616	842	844		1,309	307	573	364	665
2	-	616	528	185	1,110		476	687	679		719	365	1,015	797 2,042	383 368
3 4		435 543	419 363	339 458	539 291	211	733 997	584 835	748		652 1,213	518 1,605	1,015 632	1,376	691
		1,564	775	278	281	259	1,033	1,577	917		754	1,242	608	593	686
		804	1,286	386	1,024	357	733	806	647		656	949	2,534		1,088
7		569	1,189	305	672	295	581	569	674		827	613	1,153	1,634	943
8	500	686	786	675	914	310	675	449	1,932		1,169	759	1,185	762	498
9	453	2,609	2,113	391	500	273	621	587	2,546		880 1,686	633 677	817 633	848 1,556	589 719
10	629 547	1,052 1,067	1,436 1,124	811 500	489 449	262 409	666 519	644 513	1,917 1,115		990	1,069	592		1,403
11	714	866	2,073	872	748	307	477	429	2,051		774	1,006	677	1,064	907
13	1,741	1,544	1,290	671	397	318	446	509	1,897		912	1,710	639	1,435	613
14	1,252	842	1,053	539	381	344	413	511			719	2,941	554	1,165	604
15	774	787	1,598	572	427	636	352	429			817	1,218	511 844	918 1,185	1,008
16	1,307	655	1,028	397	410	948	334	395			914 608	1,088	886	932	753
17	850 646	581 577	765 633	414 351	449 611	387 388	331 291	355 341	801		613	819	583	1,619	771
19	556	474	589	454	722	301	686	317			961	875	650	1,099	673
20	614	554	513	315	689	241	412	295	4.		598	768	695	1,037	931
21	2,301	376	453	267	669	205	319	856			560		840		1,103
22	879	367	1,054	429	457	183	364	434			452	647 637	507 421	1,303	1,520 842
23	765	367	1,340	577	326	196	320	359			395 372			770	
24	981	298	711	230	291 489	178 158	357 319	948			438			582	100
25 26	776 694	291 324	457 646	224 327	385		281	562			739			474	
27	688	236	466		493	1	408	511						474	
28	453	452	729	212	842	385	350				485			506	
29	896	357	553	225	356		230				638		1	598 482	
30	436	216	312		250		195	911 727						319	
31	382	236	642 338	275 452	220 363		194 178	689			313			378	529
32	1,334	273 185	432	304	405		186	668			301			369	
34		163	291	243	230		186				305			367	
35		217	243	221	236	154	186							306	
36	791	228			243	1	198			1	230			339	
37					154		189 192							298	
38	1,245		297		130		376				181				
39 40	1				222		1,106						1	258	
41				1	432		297	265			244				
42	449		1	103	176	866	597				222				
43					1										
44		1								1,882					
45					188				7				545		
46	1	70.00	1						3		3 227				
48	1						265		5						
49						1,592									
50									7	- 88 - 2,11					
51	551		1							0.00					8 468
52	2,251	549	354	329	743	1,081	1,000	1			1		1	1	1

Monthly Discharge of Nottely River at Ranger, N. C. [Drainage area, 272 square miles]

		Discharges in	Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1901					
February 16-28	620	470	514	1.89	0.91
March.	4,900	440	850	3.12	3.60
April	2,500	620	1,030	3.79	4.28
May	5,800	410	1,020	3.75	4.32
June	1,660	530	815	3.00	3.35
July	3,000	380	616	2.26	2.61
August	5,440	301	1,860	6.82	7.89
September	3,600	530	866	3.18	3.55
October	745	350	463	1.70	1.96
November	560	380	386	1.42	1.58
December	9,100	380	1,140	4.19	4.83
January	1,380	277	640	2.35	2.71
January				4.45	4.63
February	9,800	560	1,210		
April	5,080	745	1,220	4.49 2.65	5.18
May	920	560	720		2.96
May	780	350	474	1.74	2.01
June	500	277	325	1.19	1.33
July	815	207	309	1.14	1.31
August	500	141	216	.794	.92
September	380	163	237	.871	.97
October	410	121	217	.798	.92
November	990	121	294	1.08	1.20
December	1,340	277	586	2.15	2.48
The year	9,800	121	537	1.98	26.62
January	560	325	434	1.60	1.84
February	7,350	410	1,270	4.67	4.86
March	5,680	780	1,490	5.48	6.32
April	2,400	650	1,110	4.08	4.55
May	1,140	410	576	2.12	2.44
June	1,860	410	858	3.15	3.51
July	1,180	277	508	1.87	2.16
August	1,660	229	398	1.46	1.68
September	560	185	238	.875	.98
October	560	163	208	.765	.88
November	560	163	291	1.07	1.19
December	500	163	250	.919	1.06
The year	7,350	163	636	2.34	31.47

MONTHLY DISCHARGE OF NOTTELY RIVER AT RANGER, N. C.—Continued

	1	Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1904					
January	885	163	296	1.09	1.26
February	1,100	253	427	1.57	1.69
March	2,250	325	675	2.48	2.86
April	1,100	350	478	1.76	1.96
May	1,020	253	366	1.35	1.56
June	1,780	185	341	1.25	1.40
July	620	103	211	.776	.89
August	885	185	313	1.15	1.33
September	590	103	175	.643	.72
October	121	103	105	.386	.44
November	277	103	125	.460	.51
December	780	141	266	.978	1.13
The year	2,250	103	315	1.16	15.75
1905					
January	3,800	253	536	1.97	2.27
February	3,200	253	750	2.76	2.87
March	1,860	380	517	1.90	2.19
April	745	325	425	1.56	1.74
May	1,500	410	649	2.39	2.76
June	885	277	. 369	1.36	1.55
July	2,600	207	472	1.74	2.0
August	620	185	290	1.07	1.2
September	380	121	176	.647	.73
October	1,500	121	252	.926	1.0
November	207	121	166	.610	6
December	4,000	185	840	3.09	3.5
The year	4,000	121	453	1.67	22.6
1914 January 22-31	254	182	206	0.757	0.2
February	406	234	314	1.15	1.2
March.	800	244	313	1.15	1.3
April	1,910	265	570	2.10	2.3
May	565	182	266	.978	1.1
June	223	106	166	.610	.6
July	483	89	219	.805	.9
August	431	89	168	.618	.7
September	162	89	118	.434	.4
October	2,980	89	298	1.10	1.2
	-,000		9.00	1.11	1.2
November	3,780	143	303	3.25	3.7

MONTHLY DISCHARGE OF NOTTELY RIVER AT RANGER, N. C.-Continued

		Discharges in	n Second-fee	t	
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1915					
January	1,620	265	708	2.60	3.00
February	1,980	265	768	2.82	2.9
March	862	410	537	1.97	2.2
April	437	310	359	1.32	1.4
May	1,230	265	422	1.55	1.7
June	687	223	321	1.18	1.3
July	653	182	292	1.07	1.2
August	223	162	186	.684	.7
September	1,540	162	236	.868	.9
	2,420	182		2.12	2.4
October			587		
November	524	202	288	1.06	1.13
December	4,580	223	845	3.11	3.5
The year	4,580	162	462	1.70	27.9
January	1,230	494	720	2.65	3.0
February	3,780	310	718	3.01	3.2
March	862	410	559	2.06	2.3
April	721	334	442	1.55	1.7
May	1,500	265	455	1.67	1.9
June	1,620	359	607	2.23	2.4
July	6,580	334	1,420	5.22	6.0
August .	1,120	359	592	2.18	2.5
September	1,620	244	377	1.39	1.5
October	1,190	265	315	1.16	1.3
November	862	265	467	1.72	1.9
December	1,620	334	472	1.74	2.0
The year	6,580	244	595	2.19	30 .1
January	1,380	465	802	2.95	3.40
February	4,580	524	1,090	4.01	4.18
March.	5,780	524	2,010	7.39	8.5
April	2,020	755	1,080	3.97	4.4
1918 October 20 21	= 100	184	1 000	4.71	2.1
October 20-31	5,100		1,280	1.94	2.1
November	1,250	276	529		
December 1919	6,300	313	1,040	3.82	4.4
January	2,350	574	954	3.51	4.0
February	2,100	540	866	3.18	3.3
March	2,550	642	1,060	3.90	4.50
April	1,450	574	754	2.77	3.09
May	2,150	448	659	2.42	2.79
June	1.030	313	481	1.77	1.98
July	2,250	313	587	2.16	2.49
August	880	228	337	1.24	1.43
September.	478	174	226	.831	.93
	1,250	164		1.10	1.2
October			300	1.35	1.5
November	540 3,900	174 288	368 657	2.42	2.79
The year		104	004	2,22	34.14
THE VEST	3,900	164	604	2.22	54.1

MONTHLY DISCHARGE OF NOTTELY RIVER AT RANGER, N. C .- Continued

		Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
					-
1920	2 200	200	-0-	0.50	0.44
January	2,800	288	735	2.70	3.11
February	3,200	478	832	3.06	3.30
March.	2,550	478	1,020	3.75	4.32
April	6,110	642	1,540	5.66	6.35
May	1,100	642	779	2.86	3.30
June	1,030	418	581	2.14	2.39
July	1,610	313	538	1.98	2.2
August	2,800	288	1,140	4.19	4.8
September	1,570	338	598	2.20	2.4
October	732	278	357	1.30	1.5
November	1,920	256	450	1.64	1.8
December	5,100	326	814	2 .97 ·	3.4
The year	6,110	256	782	2.88	39.0
1921				2.00	3.3
January	1,700	326	794	2.90	5.3
February	5,500	553	1,400	5.11	
March	1,060	122	645	2.35	2.7
April	1,370	460	698	2.55	2.8
May	1,290	352	676	2.47	2.8
June	522	302	400	1.46	1.6
July	1,030	256	387	1.41	1.6
August	732	236	344	1.26	1.4
September	732	181	259	.945	1.0
October	460	198	239	.872	1.0
November	1,100	226	439	1.60	1.3
December	1,100	278	489	1.78	2.0
The year	5,500	181	564	2.07	27.0
January	5,450	302	1,090	3.98	4.
February	3,700	522	948	3.46	3.0
March	4,350	695	1,280	4.67	5.5
April	1,650	806	1,060	3.87	4.5
May	4,500	587	1,070	3.91	4.
June	1,250	378	715	2.61	2.
July	1,410	302	502	1.83	2.:
August	587	278	352	1.28	1.
September	522	216	284	1.04	1.
October	732	207	270	.985	1.
November	460	207	229	.836	
December	3,500	216	847	3.09	3.
The year	5,450	207	721	2.63	35.

MONTHLY DISCHARGE OF NOTTELY RIVER AT RANGER, N. C .- Continued

		Discharges in	Second-feet		
Month	Maximum	Minimum	Mean	Per Square Mile	Run-off in Inches
1923					
January	1,650	319	531	1.94	2.24
February	2,480	436	812	2.96	3.08
March	2,190	489	875	3.19	3.68
April	2,240	489	765	2.79	3.11
May	2,100	574	984	3.59	4.14
June	2,100	489	877	3.20	3.57
July	1,700	436	670	2.45	2.82
August	1,700	364	561	2.05	2.36
September	698	276	346	1.26	1.41
October	341	245	267	.982	1.13
November	489	255	300	1.10	1.23
December	1,560	276	544	2.00	2.31
The year	2,480	245	628	: .29	31.08

TABLE 4
MISCELLANEOUS DISCHARGE MEASUREMENTS ROANOKE RIVER BASIN

Date	Stream	Location	Disc. Cu. Ft. Per Sec.	Method of Measuring	Authority
April 19, 1914	Beaver Island Creek	Highway Bridge at Michaels Mill, near Madison, N. C	27	Current Meter	U. S. G. S. w. s. p. 382
April 19, 1914	Beaver Island Creek	Highway Bridge at Michaels Mill, near Madison, N. C	27	Current Meter	B. M. Hall, Jr.
April 4, 1923	Dan River	Dam site, 5 miles west of Walnut Cove.	650		C. C. Babb
June 7, 1904	Mayo River	Madison, N. C.	244	Current Meter	U. S. G. S. w. s. p. 126
September 27, 1904	Mayo River	Madison, N. C.	202	Current Meter	U. S. G. S. w. s. p. 126
April 16, 1904	Mayo River	Madison, N. C.	281	Current Meter	U. S. G. S. w. s. p. 126
June 21, 1906.	Mayo River	Madison, N. C.	485	Current Meter	U. S. G. S. w. s. p. 203
February 12, 1910	Quankee Creek	Near Halifax, N. C.	51		J. J. Wells
September 11, 1909.	Roanoke River	At R. R. Bridge, 5% mile southwest of Randolph, Va	2,200	Current Meter	U. S. G. S. w. s. p. 262
December 10, 1911.	Roanoke River	At Weldon, N. C.	3,440	Current Meter	U. S. G. S. w. s. p. 322
March 18, 1912	Roanoke River	At Weldon, N. C.	162,000	Current Meter	U. S. G. S. w. s. p. 322
June 19, 1918.	Roanoke River	Former gaging station at Sou. R. R. Bridge at Ran-			
		dolph, Va.	1,430	Current Meter	U. S. G. S. w. s. p. 472
February 25, 1912	Roanoke River	Weldon, N. C.	19,700	Current Meter	U. S. G. S. w. s. p. 322
February 27, 1912	Roanoke River	Weldon, N. C.	37,600	Current Meter	U. S. G. S. w. s. p. 322
February 29, 1912	Roanoke River	Weldon, N. C.	44,900	Current Meter	U. S. G. S. w. s. p. 322
March 4, 1912	Roanoke River	Weldon, N. C.	10,200	Current Meter	U. S. G. S. w. s. p. 322
March 17, 1912	Roanoke River	Weldon, N. C.	98,800	Current Meter	U. S. G. S. w. s. p. 322
March 18, 1912	Roanoke River	Weldon, N. C.	158,000	Current Meter	U. S. G. S. w. s. p. 322
March 19, 1912	Roanoke River	Weldon, N. C.	123,000	Current Meter	U. S. G. S. w. s. p. 322
March 20, 1912	Roanoke River	Weldon, N. C.	26,600	Current Meter	U. S. G. S. w. s. p. 322
March 20, 1912	Roanoke River	Weldon, N. C.	27,000	Current Meter	U. S. G. S. w. s. p. 322
March 21, 1912	Roanoke River	Weldon, N. C.	15,600	Current Meter	U. S. G. S. w. s. p. 322
		MISCELLANEOUS DISCHARGE WEASTREMENTS TAR BIVER BASIN	AR RIVER BA	NIS	
		MARKS CALL TO THE STATE OF THE			

-	J. J. Wells B. M. Hall		J. J. Wells	J. J. Wells	
	58.08 Current Meter J. J. J. Wells 25 Current Meter B. M. Hall	79.0 Current Meter and	Floats J.	Bamboo Float J. J. Wells	
	58.08	79.0	104 9	636	
	March 3, 1920 Swift Creek Hillarda Mill site	May 23, 1919 Stony Creek 2 miles above Tar River	Downwant Charle	August 20, 1919 Tar River Rocky Mount Mills	
	March 3, 1920 Swift Creek	Stony Creek	To Direct	Tar River	
	March 3, 1920 December 20, 1912	May 23, 1919	To Division Division	August 26, 1919 December 30, 1916	

MISCELLANEOUS DISCHARGE MEASUREMENTS NEUSE RIVER BASIN

Date	Stream	Location	Disc. Cu. Ft. Per Sec.	Method of Measuring	Authority
October 10, 1911, 1916, 1919, 1921, 1921, January 4, 1924, May 13, 1824, Draught, 1921	Eno River Flat River Flat River Flat River Middle Creek Neuse River	Above old dam, Durham Water Co. Durham Durham Durham McColloughs Mill near Smithfield Bacon Rind, N. C. Just above Lake Raleigh impounding reservoir.	6.36 7.76 6.2 2.28 75.9 2,475	6.36 Float. 7.76 Weir. 6.2 Pumping. 2.28 Venturi Meter. 75.9 Current Meter475 Current Meter.	W. M. Piatt G. C. White J. C. Michie D. M. Williams Smith & Saville Martin & Winslow E. B. Bain

MISCELLANEOUS DISCHARGE MEASUREMENTS CAPE FEAR RIVER BASIN

June 29, 1918.	Beaver Creek	Just below Beaver Lake at bridge on Fayetteville-			
		Carthage Road	10.2	Current Meter	U. S. G. S. w. s. p. 472
May 27, 1903	Big Rockfish Creek.	McNeils	351	Current Meter	U. S. G. S. w. s. p. 98
June 29, 1918.	Cape Fear River	Highway Bridge at Fayetteville	1.650	Current Meter	U. S. G. S. w. s. p. 472
October 15, 1912	Haw River	Tail Race Lower Dam, Va. Cotton Mills.	328	Current Meter	B. M. Hall, Jr.
December 20, 1912	Haw River	Head Race Hopedale Mills.	17.5	Current Meter	B. M. Hall, Jr.
Aver. Yr	Little River		80	Estimated	B. M. Hall, Jr.
Min. Low Yr.	. Lower Little River	Lower Little River. Reaves Bridge near Linden, N. C.	20	Estimated	B. M. Hall, Jr.
October 1, 1902	Lower Little River	Lower Little River. Near Manchester, N. C.	491	Current Meter	U.S. G. S. W. S. D. 98
October 2, 1902	Lower Little River	Lower Little River. Near Manchester, N. C.	410	Current Meter	U. S. G. S. W. S. D. 98
June 29, 1918.	. Lower Little River	Lower Little River. Lemonts Bridge 4 miles upstream from Manchester.	188	Current Meter	U. S. G. S. W. S. D. 472
June 29, 1918.	Lower Little River	Lower Little River Highway Bridge at Manchester	213	Current Meter	U. S. G. S. W. S. D. 472
August 14, 1919	Lower Little River	Lower Little River. Reaves Bridge near Linden	745	Current Meter	B. M. Hall. Jr.
August 16, 1919	Lower Little River.	Lower Little River. Reaves Bridge near Linden	355	Current Meter	R M Hall Ir
May 27, 1903	Little Rockfish Creek McNeils, N. C.	McNeils, N. C.	143	Current Meter	II S. G. S. W. e. n. 98
July 1, 1918	Little Rockfish Creek	Little Rockfish Creek Rickfish Bridge 1/2 mile above the mouth	73	Current Meter	U.S. G. S. W. S. D. 472
September, 1920		Carboro, N. C.	0.63	Weir	G. M. Braune
September 6, 1902	Rockfish Creek	Near Brunt, N. C.	318	Current Meter	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
October 16, 1902	Rockfish Creek	Near Brunt, N. C.	440	Current Meter	T S C S E S C S C S C S C S C S C S C S C
May 27, 1903	Rockfish Creek	Near Brunt, N. C.	563	Current Meter	1 S C S S S S S S S S S S S S S S S S S
July 1, 1918	Rockfish Creek	Rockfish Bridge 1/2 mile upstream from mouth of Little			
		Rockfish Creek	254	Current Meter	U. S. G. S. W. S. D. 472
June 21, 1906	. South Buffalo Creek	June 21, 1906 South Buffalo Creek Near Greensboro, N. C	7.6	Current Meter	U. S. G. S. W. S. D. 203

MISCELLANEOUS DISCHARGE MEASUREMENTS YADKIN RIVER BASIN

Current Meter Current Meter Current Meter Current Meter			Current Meter U. S. G. S. w. s. p. 63 Float	Current Meter U. S. G. S. w. s. p. 63 Current Meter U. S. G. S. w. s. p. 63 Current Meter U. S. G. S. w. s. p. 63
801.0 317.1 265.44 243.0 307.0	277 306 170 209 604 30 65.0	24.0 27.0 119.0 61.0 37.0	30.0 139 .24 27 27 549 1172 118 235 156 80	99
Greensboro and Wilkesboro R. R. trestle Mt. Airy below Lovells & Stewarts Creek	Mt. Airy above Lovelis & Stewarts Creek. Near Siloam, N. C. Near Siloam, N. C. Near Siloam, N. C. Near Siloam, N. C. Ford of road from Roaring River to Elkin Greensbror and Wilkesboro R. R. Bridge.	Greensboro and Wilkesboro R. R. Bridge. K. mile above ford. M. mile above ford.	14 mile above ford Elkerille, Wilkes County, N. C. Elkin, N. C. Greensboro and Wilkesboro R. R. trestle Near Crutchfield, N. C.	Footbridge on Mt. Pleasant roadFootbridge on Mt. Pleasant road
Ararat River Ararat River Ararat River Ararat River Ararat River Ararat River	Arata River Arata River Arata River Arata River Arata River Arata River Bug Bugaboo Creek Big Elkin River	Big Elkin River Big Elkin River Bik Creek. Elk Creek.	Elk Creek Elkin Creek Elkin Creek Fisher River	kin River Louis Fork of Yad- kin River Louis Fork of Yad- kin River
June 27, 1900 July 11, 1900 August 2, 1900 September 29, 1900 October 31, 1900	November 11, 1903. April 21, 1904 June 9, 1904 September 24, 1904 January 5, 1905 August 24, 1905 September 27, 1900 June 28, 1900	July 3, 1900 July 4, 1900 September 27, 1900- June 20, 1900- July 13, 1900 August 6, 1906	September 26, 1900. March 22, 1921 April 19, 1904 June 9, 1904 July 10, 1900 August 3, 1900 September 28, 1900 April 20, 1904 April 20, 1904	July 13, 1900August 6, 1900

MISCELLANEOUS DISCHARGE MEASUREMENTS YADKIN RIVER BASIN—Continued

Date	Stream	Location	Disc. Cu. Ft. Per Sec.	Method of Measuring	Authority
September 26, 1900	Louis Fork of Yad-				
	kin River	Footbridge on Mt. Pleasant road	63	Current Meter	S. G.
November 10, 1903	Lovells Creek	Mt. Airy	44	Current Meter	U. S. G. S. w. s. p. 98
June 26, 1900	Mitchell River	Greensboro and Wilkesboro R. R. bridge	393.1	Current Meter	U. S. G. S. w. s. p. 63
July 10, 1900	Mitchell River	Greensboro and Wilkesboro R. R. bridge	139.2	Current Meter	U. S. G. S. w. s. p. 63
Aug. 3, 1900	Mitchell River	Greensboro and Wilkesboro R. R. bridge	119.0	Current Meter	
September 28, 1900.	Mitchell River	Greensboro and Wilkesboro R. R. bridge	160.0	Current Meter	U. S. G. S. w. s. p. 63
November 1, 1900	Mitchell River	Greensboro and Wilkesboro R. R. bridge	216.0	Current Meter	U. S. G. S. w. s. p. 63
April 20, 1904	Mitchell River	At Burch, N. C.	0.96	Current Meter	U. S. G. S. w. s. p. 126
September 23, 1904.	Mitchell River	At Burch, N. C.	0.69	Current Meter	U. S. G. S. w. s. p. 126
April 27, 1905	Mitchell River	At Burch, N. C.	125.0	Current Meter	U. S. G. S. w. s. p. 167
June 23, 1900	Mulberry River	Trestle of Greensboro and Wilkesboro division of Sou.			
		R. R.	108.4	Current Meter	U. S. G.S. w. s. p. 63
July 3, 1900	Mulberry River	Trestle of Greensboro and Wilkesboro division of Sou.			
		R. B.	50.3	Current Meter	U. S. G. S. w. s. p. 63
August 4, 1900	Mulberry River	Trestle of Greensboro and Wilkesboro division of Sou.			
		R. R.	39.25	Current Meter	U. S. G. S. w. s. p. 63
September 27, 1900	Mulberry River	Trestle of Greensboro and Wilkesboro division of Sou.	6.19	Cumont Moton	11 S C S H S D S 11
November 2, 1900	Mulberry River	Trestle of Greensboro and Wilkesboro division of Sou.	7.10	Current areter	
		R. R.	55.0	Current Meter	U. S. G. S. w. s. p. 63
November 7, 1903	Mulberry Creek	Near North Wilkesboro, N. C.	47.0	Current Meter	S. G.
April 19, 1904	Mulberry River	Near North Wilkesboro, N. C.	41.0	Current Meter	S. G.
June 8, 1904	Mulberry River	Near North Wilkesboro, N. C.	61.0	Current Meter	S. G.
September 22, 1904.	Mulberry River	Near North Wilkesboro, N. C.	29.0	Current Meter	S
January 4, 1905	Mulberry River	Near North Wilkesboro, N. C.	28.0	Current Meter	
April 26, 1905	Mulberry River	Near North Wilkesboro, N. C.	61.0	Current Meter	S
June 25, 1900	Roaring River	Greensboro and Wilkesboro R. R. bridge	520.2	Current Meter	S. G
July 9, 1900	Roaring River	Greensboro and Wilkesboro R. R. bridge	161.4	Current Meter	vi co
August 4, 1900	Roaring River	Greensboro and Wilkesboro R. R. Bridge	117.0	Current Meter	U. S. G. S. W. S. p. 63
November 27, 1900	Roaring River	Greensboro and Wilkesboro R. R. bridge	197.0	Current Meter	d 6
	The same of the sa	CICCUSSOID WITH HINCOOD IN TO DIRECTOR	2		1

	S. G.
125.0 178.0 178.0 113.0 2113.0 2113.0 2113.0 20	1,469 5,237 3,476 1,023 92,857
At Roaring River, N. C. And Wilkesboro North Wilkesboro, N. C. Second ford below Patterson's Mill, N. C.	Siloam. Siloam. R. B. bridge near Rockingham. Crutchfield, N. C.
Roaring River Roaring River Roaring River Roaring River Reddie River Stony Creek Tadkin River Yadkin River	Yadkin River Yadkin River Yadkin River Yadkin River
April 24, 1904 June 9, 1904 September 23, 1905 April 26, 1905 August 23, 1900 August 24, 1900 April 18, 1900 April 18, 1904 April 18, 1904 June 9, 1904 September 23, 1904 June 9, 1906 June 19, 1906 June 11, 1900 July 13, 1900 July 13, 1900 July 13, 1900 July 13, 1900 July 14, 1900 July 12, 1900 July 12, 1900 July 12, 1900 July 12, 1900 July 14, 1900 July 11, 1900	October 31, 1900 April 15, 1901 October 20, 1902 April 21, 1904

MISCELLANEOUS DISCHARGE MEASUREMENTS YADKIN RIVER BASIN—Continued

Authority	U. S. G. S. w. s. p. 502 U. S. G. S. w. s. p. 502 W. S. G. S. w. s. p. 502 McNeely Dubose
Method of Measuring	Current Meter U. S. G. S. w. s. J. Current Meter U. S. G. S. w. s. J. Current Meter U. S. G. S. w. s. J. Current Meter U. S. G. S. w. s. J. Current Meter U. S. G. S. w. s. Turbine discharge and Lake Volumes McNeely Dubose
Disc. Cu. Ft. Per Sec.	2,440 6,570 2,730 13,800 2,170 1,300
Location	U. S. G. S. Gaging Station at Donnaha, N. C. U. S. G. S. Gaging Station at Donnaha, N. C. U. S. G. S. Gaging Station at Donnaha, N. C. U. S. G. S. Gaging Station at Dohhaha, N. C. U. S. G. S. Gaging Station at Dohhaha, N. C. Badin, N. C.
Stream	Yadkin RiverYadkin RiverYadkin RiverYadkin RiverYadkin RiverYadkin River
Date	April 23, 1920 July 12, 1920 July 15, 1920 August 26, 1920 September 11, 1920 October 26, 1921

MISCELLANEOUS DISCHARGE MEASUREMENTS CATAWBA RIVER BASIN

June 14, 1900.	Buck Creek	1/8 mile above mouth at main ford	16.15	Current Meter	U. S. G. S. w. s. p. 63
August 20, 1900	Buck Creek	1/8 mile above mouth at main ford	41.4	Current Meter	U. S. G. S. w. s. p. 63
June 14, 1900.	Cane Creek	Lowest ford of main Morganton road	18.58	Current Meter	U. S. G. S. w. s. p. 63
June 18, 1900.	Cane Creek	Lowest ford of main Morganton road	28.45	Current Meter	U. S. G. S. w. s. p. 63
August 17, 1900	Cane Creek	Lowest ford of main Morganton road	7.2	Current Meter	U. S. G. S. w. s. p. 63
Summers, 1921-1922.	Cabin Creek	Just below mouth of Mill Creek, Moore County, N. C	9	Weir	Harwood Beebe
November 13, 1903	Catawba River	Mt. Holly, N. C.	1,192	Current Meter	U. S. G. S. w. s. p. 98
December 3, 1903	Catawba River	Belmont, N. C.	1,393	Current Meter	U. S. G. S. w. s. p. 98
March 5, 1904	Catawba River	Near Belmont, N. C.	684	Current Meter	U. S. G. S. w. s. p. 127
March 4, 1904	Catawba River	Near Belmont, N. C.	2,181	Current Meter	U. S. G. S. w. s. p. 127
August 22, 1911	Catawba River	Rock Hill Station	1,415		
March 16, 1912	Catawba River	Rock Hill Station	161,300	Estimated	
March 16, 1912	Catawba River	Catawba Station.	146,000	Weir	
March 16, 1912	Catawba River	Rocky Creek Station	197,600	Weir	
June 29, 1918	Catawba River	Highway bridge at Bridgewater, N. C.	333	Current Meter	U. S. G. S. w. s. p. 472
June 28, 1900	Clear Creek	200 feet above ford of main road	25.25	Current Meter	U. S. G. S. w. s. p. 63
August 28, 1900	Clear Creek	200 feet above ford of main road	12.0	Current Meter	U. S. G. S. w. s. p. 63
June 28, 1900	Crib Creek	Near ford of main road	28.03	Current Meter	U. S. G. S. w. s. p. 63
August 28, 1900	Crib Creek	Near ford of main road	10.0	Current Meter	U. S. G. S. w. s. p. 63
June 28, 1900	Curtis Creek	200 feet above ford of Oldfort road	82.11	Current Meter	U. S. G. S. w. s. p. 63
August 20, 1900	Curtis Creek	200 feet above ford of Oldfort road	16.50	16.50 Current Meter	U. S. G. S. w. s. p. 63

.029 Venturi Meter H. L. Milner	ant Meter U. S	Current Meter U. S	Current Meter	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S	WeirH. I	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S	Current Meter. U. S. G. S. w. s. p.	2	240.2 Current Meter U. S. G. S. w. s. p. 63		67.3 Current Meter U. S. G. S. W. S. D. 03	Comment Motor	Current meter	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Current Meter U. S. G. S. W. S. p.	U. S. G. S. w. s. p.	Current Meter. U. S. G. S. w. s. p.	U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter	0
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Morganton water supply		Z	ż	Near Flat Rock, N. C.	Near Oldfort	Morganton	At Linville, N. C.	At Linville, N. C.	1/2 mile above Falls.	1 mile above mouth at Bridgewater, N. C	2 miles above mouth.	Bridgewater, N. C.	Bridgewater, N. C.	Bridgewater, N. C.	Bridgewater, N. C.	Bridgewater, N. C.	At mouth.	At mouth		First ford above mouth.		First ford above mouth	į	First ford above mouth	Near Bridgewater, N. C	Near Bridgewater, N. C	Near Bridgewater, N. C	Near Bridgewater, N. C.	Near Morganton	Near Morganton	Near Morganton	Near Morganton	Footbridge 100 yards above mouth			
Henry Fork	Green River	Green River	Green River.	Green River	Jarrett Creek	John River.	Linville River	Linville River	Linville River	Linville River	Lower Creek	Lower Creek	Lower Creek	Lower Creek	Muddy Creek	Muddy Creek	Muddy Creek	Muddy Creek	Muddy Creek	Mulberry Creek	Mulberry Creek	North Fork of Ca-	tawba River	North Fork of Ca-	tawba River	North Fork of Ca-	tawba Kiver	Paddy Creek	Paddy Creek	Paddy Creek	Paddy Creek	Silver Creek	Silver Creek	Silver Creek	Silver Creek	Steel Creek
November 11, 1923.	November 13, 1905	November 13 1905	June 13, 1906	September 14, 1906.		February 13, 1903	June 21, 1900	June 24, 1900	October 18, 1904	June 27, 1918.	June 13, 1900.	July 6, 1900	August 8, 1900	September 24, 1900.	June 14, 1900.	June 16, 1900	July 10, 1910	August 17, 1900	September 21, 1900	September 25, 1900.	November 6, 1900	July 3, 1900		August 18, 1900		September 21, 1900.		June 14, 1900	June 16, 1900	July 10, 1900	August 17, 1900	June 14, 1900	August 10, 1900	September 24, 1900.	June 14, 1901	June 20, 1900.

MISCELLANEOUS DISCHARGE MEASUREMENTS CATAWBA RIVER BASIN—Continued

Date	Stream	Location	Disc. Cu. Ft. Per Sec.	Method of Measuring	Authority
March 4, 1904 June 15, 1900 June 26, 1900 July 6, 1900 July 6, 1900 September 24, 1900 June 20, 1900 June 20, 1900 November 6, 1900 October 22, 1921	South Fork Cataw-ba River. Turkey Cove Creek. Upper Creek. Upper Creek. Upper Creek. Upper Creek. Upper Creek. Upper Creek. Wilson Creek. Wilson Creek.	South Fork Cataw- Ba River. Turkey Cove Creek. Just above second ford. Turkey Cove Creek. Just above second ford. Just above second ford. Just above mouth. Jupper Creek. Just above Mull. Jupper Creek. Jupper Creek. Jupper Creek. Jupper Creek. Jupper Creek Falls. Jupper Creek. Jupper Creek Falls. Jupper Creek. Jupper Creek Falls.	629 21.48 164.8 182.4 50.0 85.05 60.0 20.42 27.0 28.0 54.4	29 Current Meter	U. S. G. S. W. S. D. 127 U. S. G. S. W. S. D. 127 U. S. G. S. W. S. D. 633 U. S. G. S. W. S. D. 634 U. S. G. S. W. S. D.

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October 6. 1900 Broad River	Broad River	Near mouth Buffalo Creek	145.4	145.4 Current Meter	U. S. G. S. w. s. p. 49
October 6, 1900 Broad River	Broad River.	Bridge at Batcave, N. C.	62.4	Current Meter	U. S. G. S. w. s. p. 49
October 18, 1900 Broad River	Broad River	McClure's Bridge	434	Current Meter	U. S. G. S. w. s. p. 63
August 9, 1901 Broad River	Broad River	McClure's Bridge	683.5	683.5 Current Meter	U. S. G. S. w. s. p. 63
August 10, 1901 Broad River	Broad River	Near Chimney Rock	247.6	Current Meter	U. S. G. S. w. s. p. 63
August 21, 1900 Broad River	Broad River	Bridge at Batcave, N. C.	50.1	50.1 Current Meter	U. S. G. S. w. s. p. 63
August 21, 1900 Broad River	Broad River	Bridge at Batcave, N. C.	48.0	Current Meter	U. S. G. S. w. s. p. 49
August 22, 1900 Broad Biver	Broad River	Near mouth Buffalo Creek	57.1	57.1 Current Meter	U. S. G. S. w. s. p. 49
August 25, 1900 Broad River	Broad River	McClure's Bridge, N. C.	434.0	Current Meter	U. S. G. S. w. s. p. 63
August 28, 1900 Broad River	Broad River	Ford 1 mile above mouth of Second Broad	649.00	649.00 Current Meter	U. S. G. S. w. s. p. 63
September 20, 1916 Broad River	Broad River	99 Island Dam	186,230	Weir	Mees & Mees
September 20, 1916 Broad River	Broad River	Gaston Shoals	176,950	Weir	Mees & Mees
September 20, 1916.	September 20, 1916. Broad River	Parr Shoals	252,500	Weir	Mees & Mees
August 22, 1901	Buffalo Creek	August 22, 1901 Buffalo Creek 15 yards below main ford	17.0	17.0 Current Meter	U. S. G. S. w. s. p. 63

17.0 Current Meter U. S. G. S. w. s. p. 63	Current Meter	Current Meter U. S. G. S. w. s. p.	Current Meter. U. S. G. S. w. s. p.	S. G. S. w. s.	S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	S. G. S. w. s. p.	Current Meter U. S. G. S. w. s.	Current Meter. U. S. G. S. w. s. p.	S. G. S. w. s. p.	Current Meter U. S. G. S. w. s.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S.	Current Meter U. S. G. S. w. s. p.	G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	153.3 Current Meter U. S. G. S. w. s. p. 49	Current Meter U. S. G. S. w. s. p.		223.0 Current Meter U. S. G. S. w. s. p. 49	171 0 Cumont Motor	Cumont Moton	Current Meter	Current Meter.
1 mile showe month	At mouth	Near mouth	Bridge at Rutherfordton road	Bridge at Rutherfordton road	Bridge on road to Lima, N. C.	Near mouth	Near mouth	Near Saluda, on Howard Gap road		Cox's Bridge	Cox's Bridge	At mouth	At mouth	Near mouth	1 mile above mouth, North Carolina	1 mile above mouth, North Carolina	Near mouth	Near mouth	Iron Bridge at Marietta, N. C.	Iron Bridge at Marietta, N. C.	Bridge on Lime-Cleveland Mills road, N. C.	2 miles below Humphrey's store, N. C.	Near mouth	At mouth.	At mouth	Bridge on Rutherfordton-Morganton road	Bridge on Rutherfordton-Morganton road	Iron Bridge near Bostic Station.	11/2 miles east of Forest City	1½ miles east of Forest City	Freeman Bridge below mouth of Middle Saluda Creek,	N. C.	South Saluda Creek. Freeman Bridge below mouth of Middle Saluda Creek,	9 miles obours mouth of Middle Colude Carely M C	2 miles above mouth of Middle Saluda Creek, IN. C.	or minute parada crear,
Cane Creek	14	Cove Creek	Cove Creek	Cove Creek	Fall Creek	First Broad River	First Broad River	Green River	Green River	Green River.	Green River	Hickory Nut Creek.	Holling Creek	Maple Creek	Middle Saluda Creek	Middle Saluda Creek	Mountain Creek	Mountain Creek	North Saluda Creek	North Saluda Creek	North Saluda Creek	North Saluda Creek	Puzzle Creek	Reedy Patch Creek.	Robersons Creek	Second Broad River	Second Broad River	Second Broad River	Second Broad River	Second Broad River	South Saluda Creek.		South Saluda Creek.	South Colude Cont	South Saluda Creek.	Whiteoak Creek
1 1000 1.6 terrore	Amount 93 1000	Sentember 3, 1900	August 22, 1900	October 6, 1900	September 6, 1900	August 30, 1900	October 10, 1900	Sentember 3, 1900	August 25, 1900	October 8, 1900	August 9, 1901	August 21, 1900	August 23, 1900	August 25, 1900	September 7, 1900	October 13, 1900	August 25, 1900	October 8, 1900	September 7, 1900	October 13, 1900	September 6, 1900	September 6, 1900	August 23, 1900	August 21, 1900	August 24, 1900	August 24, 1900	October 4, 1900	August 13, 1901	August 23, 1900	October 5, 1900	September 7, 1900		October 14, 1900	Contraction 7 1000	Ootober 14 1000	Angust 31, 1900

MISCELLANEOUS DISCHARGE MEASUREMENTS SOUTH FORK NEW RIVER BASIN

Date	Stream	Location	Disc. Cu. Ft. Per Sec.	Method of Measuring	Authority
July 19, 1900	Beaver Creek	At mouth	22.4	Current Meter	U. S. G. S. w. s. p. 63
July 23, 1900	East Fork New		1.1.		
	River	Ford of Boone-Aho road.	10.4	Current Meter	U. S. G. S. w. s. p. 63
October 24, 1900	East Fork New				
	River	Ford of Boone-Aho road	109.0	Current Meter	U. S. G. S. w. s. p. 63
July 24, 1900	Elk Creek	Elk Crossroads	10.0	Current Meter	U. S. G. S. w. s. p. 63
July 23, 1900	Flannery Fork New				
	River	Ford of Boone-Blowing Rock road	10.4	Current Meter	U. S. G. S. w. s. p. 63
October 24, 1900	Flannery Fork New				
	River	Ford of Boone-Blowing Rock road	107.0	Current Meter	U. S. G. S. W. S. D. 63
July 24, 1900	Gap Creek	1/8 mile above mouth.	23.4	Current Meter	S. G. S. W. S. D.
July 18, 1900	Meat Camp Creek	1/4 mile below Moretz	32 33	Current Meter	V.
October 25, 1900	Meat Camp Creek	1/4 mile below Moretz	0.68	Current Meter	v.
June 24, 1901.	Meat Camp Creek	1/4 mile below Moretz	164 0	Current Meter	T.
July 23, 1900	Middle Fork New				4
	River	Ford of Boone-Aho road	24.4	Current Meter	U. S. G. S. w. s. p. 63
October 24, 1900	Middle Fork New				•
	River	Ford of Boone-Aho road.	234.0	Current Meter	U. S. G. S. w. s. p. 63
July 27, 1900	Mulberry Creek	Near mouth	109.0	Current Meter	U. S. G. S. w. s. p. 63
July 18, 1900	Old Field Creek		19.4	Current Meter	S. G. S. w. s. p.
July 28, 1900	Prather Creek	1½ mile below Scottville.	25.0	Current Meter	S. G. S.
July 28, 1900	South Fork New				
	River	New River	751.0	Current Meter	U. S. G. S. W. S. D. 63
October 28, 1900	South Fork New				
	River	New River	1,635.0	Current Meter	U. S. G. S. w. s. p. 63
June 27, 1901	South Fork New				
	River	New River	1,976.0	Current Meter	U. S. G. S. w. s. p. 63
July 18, 1900	South Fork New				
	River	New River	165.0	Current Meter	U. S. G. S. w. s. p. 63

	741.1 Current Meter U. S. G. S. w. s. p. 63	968.0 Current Meter U. S. G. S. w. s. p. 63		159.0 Current Meter U. S. G. S. w. s. p. 63	12.0 Current Meter C. C. Babb	v	12.0 Current Meter H. A. Underwood	Current Meter U. S. G. S. w. s. p. 63	12.5 Weir H. C. London	18.9 Weir H. C. London	
- ;	741.1	0.896		159.0	12.0		12.0	108	12.5	6.81	
	New Kiver	River New River	Ford near mouth of Middle Fork of New River near	Boone	September 21, 1919 New-South Fork Highway bridge 3 miles south of Boone			Near Boone	July 29, 1924 Long Hope Creek Ashe County just above Falls	August 15, 1921 Long Hope Creek Ashe County just above Falls	
South Fork New	South Fork New	River South Fork Now	River		New-South Fork	New River-South	Fork	West Fork	Long Hope Creek	Long Hope Creek	
October 25, 1900 South Fork New	June 24, 1901.	Tuna 94 1001			September 21, 1919	September 21, 1919. New River-South		June 24, 1901	July 29, 1924	August 15, 1921	

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DISCHARGE MEASU
MISCELLANEOUS

Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter. U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter	Current Meter U. S. G. S. w. s. p. 49	Current Meter. U. S. G. S. w. s. p. 49	Current Meter U. S. G. S. w. s. p. 49	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 49	Current Meter U. S. G. S. w. s. p. 49		Current Meter U. S. G. S. w. s. p. 63		708.0 Current Meter U. S. G. S. w. s. p. 63
. 26.2	80.4	44.0	67.0	140.0	10.0	85.0	144.0	30.0	105.0	34.3	140.0	444.0	199.0	318.2		536.0		708.0
100 yards above mouth.	100 yards above mouth	1/8 mile above mouth.	1/8 mile above mouth	Near Jefferson	Elk Crossroads, N. C.	14 mile above mouth, Va	14 mile above mouth, Va.	Below Peasley's Mill	Below Peasley's Mill.	14 mile above mouth	14 mile above mouth.	14 mile above mouth.	Ford of Independence Old-town road, Va.	Ford of Independence Old-town road, Va.		Weaversford		Weaversford
Big Laurel Creek	Big Laurel Creek	Buffalo Creek	Buffalo Creek	Buffalo Creek	Elk Creek	Fox Creek	Fox Creek	Helton Creek	Helton Creek	Horse Creek	Horse Creek	Horse Creek	Little River	Little River	North Fork of New	River	North Fork of New	River
July 20, 1900	October 26, 1900	July 20, 1900	October 26, 1900	June 20, 1901	July 24, 1900	July 29, 1900	October 28, 1900	July 25, 1900	October 27, 1900	July 25, 1900	October 27, 1900	June 25, 1901	July 31, 1900	October 29, 1900	July 28, 1900		October 27, 1900	

MISCELLANEOUS DISCHARGE MEASUREMENTS NORTH FORK OF NEW RIVER BASIN-Continued

Date	Stream	Location	Disc Cu. Ft. Per Sec.	Method of Measuring	Authority
June 27, 1901	North Fork of New River	Wayroneford	1 377 0	1 277 0 Curmont Motor	2 C
June 20, 1901	North Fork of New River	Below mouth of Laurel Creek	313.0	Current Meter	U. S. G. S. w. s. p. 63
July 21, 1900	North Fork of New River	1 mile below Creston	49.3	Current Meter	U. S. G. S. w. s. p. 63
June 20, 1901	River North Fork of New	1 mile below Creston.	194.0	Current Meter	U. S. G. S. w. s. p. 63
July 20, 1900	1 .	1 mile below Creston	196.0	Current Meter	U. S. G. S. w. s. p. 63
		River	. 32.2	Current Meter	U. S. G. S. w. s. p. 63
October 29, 1900		Peach Bottom Creek 200 yards above mouth, Va.	36.0	Current Meter	U. S. G. S. W. S. p. 49
July 21, 1900		Creston	37.0	Current Meter	U. S. G. S. w. s. p. 63
July 28, 1900 October 28, 1900	Wilson Creek	2 miles above mouth, Va	35.1	Current Meter	U. S. G. S. w. s. p. 49 U. S. G. S. w. s. p. 49

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7.0 Current Meter U. S. G. S. w. s. p. 49	8.0 Current Meter U. S. G. S. w. s. p. 49	7.3 Current Meter U. S. G. S. w. s. p. 49	7.4 Current Meter U. S. G. S. w. s. p. 49	0.85 Current Meter U. S. G. S. w. s. p. 49	5.05 Current Meter U. S. G. S. w. s. p. 49
7.0	8.0	7.3	7.4	0.83	5.0
August 9, 1900 Beaver Dam Creek Near Leander, N. C	October 6, 1900 Beaver Dam Greek. Near Leander, N. C	August 9, 1900 Beech Creek Above mouth of Fogey Creek, N. C	Above mouth of Fogey Creek, N. C.	August 9, 1900 Big Dry Run 1/8 mile above mouth, N. C	Cranberry, N. C.
Beaver Dam Creek.	Beaver Dam Creek.	Beech Creek		Big Dry Run	August 4, 1900 Blevins Creek Cranberry, N. C.
August 9, 1900	October 6, 1900	August 9, 1900	October 6, 1900 Beech Creek	August 9, 1900	August 4, 1900

August 10, 1900	Boone Fork of Wa-				
	tauga River	Shull's Mill, N. C.	12.0	Current Meter	U. S. G. S. w. s. p. 49
October 7, 1900	Boone Fork of Wa-				
	tauga River	Shull's Mill, N. C.	13.0	Current Meter	S. G. S. w. s. p.
July 19, 1900	Brush Creek	Near Carter, Tenn.	10.03	Current Meter	U. S. G. S. w. s. p. 49
August 16, 1900	Brush Creek	Near Carter, Tenn.	9.47	Current Meter	S. G. S. w. s. p.
September 24, 1900.	Brush Creek	Near Carter, Tenn.	5.14	Current Meter	S. G. S. w. s. p.
August 12, 1900	Brushy Fork of Cove				
	Creek	At mouth, N. C.	5.19	Current Meter	U. S. G. S. w. s. p. 49
August 2, 1900	Buffalo Creek	At mouth, Tennessee	20.0	Current Meter	U. S. G. S. w. s. p. 49
October 4, 1900	Buffalo Creek	At mouth, Tennessee	10.0	Current Meter	U. S. G. S. w. s. p. 49
August 10, 1900	Cove Creek	At mouth, N. C.	12.0	Current Meter	U. S. G. S. w. s. p. 49
October 7, 1900	Cove Creek	At mouth, N. C.	14.0	Current Meter	U. S. G. S. w. s. p. 49
August 12, 1900	Cove Creek	Above mouth of Bushy Fork, N. C.	23.0	Current Meter	U. S. G. S. w. s. p. 49
August 4, 1900	Cranberry Creek	Cranberry, N. C.	5.09	Current Meter	U. S. G. S. w. s. p. 49
August 6, 1900	Dark Ridge Creek	1/2 mile above mouth, Tenn.	3.0	Current Meter	U. S. G. S. w. s. p. 49
July 30, 1900	Doe Creek	Mouth of Doe (town), Tenn.	59.0	Current Meter	U. S. G. S. w. s. p. 49
August 13, 1900	Doe Creek	Mouth of Doe (town), Tenn.	26.2	Current Meter	U. S. G. S. w. s. p. 49
October 9, 1900	Doe Creek	Mouth of Doe (town), Tenn.	28,38	Current Meter	U. S. G. S. w. s. p. 49
August 13, 1900	Doe Creek	Ivyspring Post Office, Tenn.	00.6	Current Meter	U. S. G. S. w. s. p. 49
August 2, 1900	Doe River	Above Elizabethton, Tenn.	143.4	Current Meter	U. S. G. S. w. s. p. 49
August 17, 1900	Doe River	Above Elizabethton, Tenn.	106.0	Current Meter	U. S. G. S. w. s. p. 49
October 5, 1900	Doe River	Above Elizabethton, Tenn	82.0	Current Meter	U. S. G. S. w. s. p. 49
December 31, 1900	Doe River	Above Elizabethton, Tenn.	304.0	Current Meter	U. S. G. S. w. s. p. 49
August 3, 1900	Doe River	Near Allentown, Tenn.	72.0	Current Meter	U. S. G. S. w. s. p. 49
August 18, 1900	Doe River	Near Allentown, Tenn.	50.0	Current Meter	U. S. G. S. w. s. p. 49
October 5, 1900	Doe River	Near Allentown, Tenn.	39.3	Current Meter	U. S. G. S. w. s. p. 49
August 3, 1900	Doe River	2 miles below Roan Mountain, Tenn	41.3	Current Meter	U. S. G. S. w. s. p. 49
October 23, 1906	Doe River	Elizabethton, Tenn.	318	Current Meter	U. S. G. S. w. s. p. 205
August 10, 1900	Dutch Creek	Valle Cruces, N. C.	11.0	Current Meter	U. S. G. S. w. s. p. 49
October 7, 1900	Dutch Creek	Valle Cruces, N. C.	0.9	Current Meter	U. S. G. S. w. s. p. 49
August 6, 1900	Elk Creek	1/2 mile below mouth of the Little Elk, Tenn	64.0	Current Meter	U. S. G. S. w. s. p. 49
August 9, 1900	Fogey Creek	At mouth, N. C.	1.4	Current Meter	U. S. G. S. w. s. p. 49
October 6, 1900	Fogey Creek	At mouth, N. C.	2.4	Current Meter	U. S. G. S. w. s. p. 49
August 13, 1900	Forge Creek	Near mouth, Tenn	7.0	Current Meter	U. S. G. S. w. s. p. 49
August 2, 1900	Gap Creek	At mouth, Tenn	7.0		U. S. G. S. w. s. p. 49
October 4, 1900	Gap Creek	At mouth, Tenn.	3.0	Current Meter	U. S. G. S. w. s. p. 49

MISCELLANEOUS DISCHARGE MEASUREMENTS WATAUGA RIVER BASIN—Continued

		MISCELLANEOUS DISCHARGE MEASUREMENTS WATAUGA MIVER DASIN—Communed	LIVER DASH	-Continuea	0
Date	Stream	Location	Disc. Cu. Ft. Per Sec.	Method of Measuring	Authority
Sentember 20, 1919	Laurel Creek	Mouth	8.0	Float	C. C. Babb
September 21, 1919.	Laurel Creek.	Mouth	8.0	Current Meter	H. A. Underwood
August 10, 1900	Laurel Creek (lower)	At mouth, N. C.	4.0	Current Meter	0/2
October 7, 1900	Laurel Creek (lower)		3.09	Current Meter	U. S. G. S. w. s. p. 49
August 10, 1900	Laurel Creek (upper)	At mouth, N. C.	10.0	Current Meter	7/2
October 7, 1900	Laurel Creek (upper)	At mouth, N. C.	0.9	Current Meter	T/D
August 5, 1900	River	Allentown. Tenn.	30.0	Current Meter	U. S. G. S. w. s. p. 49
August 17, 1900	Laurel Fork of Doe				
	River	Allentown, Tenn.	15.0	Current Meter	U. S. G. S. w. s. p. 49
October 5, 1900	Laurel Fork of Doe				
	River	Allentown, Tenn.	0.6	Current Meter	U. S. G. S. w. s. p. 49
December 29, 1900	Laurel Fork of Doe				
	River	Allentown, Tenn.	27.0	Current Meter	S. G. S. w. s. p.
August 3, 1900	Little Doe River	Allentown, Tenn.	35.0	Current Meter	S. G. S.
October 5, 1900	Little Doe River	Allentown, Tenn.	17.0	Current Meter	S. G. S.
December 29, 1900	Little Doe River	Allentown, Tenn.	28.3	Current Meter	U. S. G. S. w. s. p. 49
August 6, 1900	Little Elk Creek	At mouth, N. C.	0.9	Current Meter	S. G. S.
July 30, 1900	Mill Creek	At mouth, Tenn	13.0	Current Meter	S
August 11, 1900	Moody Mill Creek	At mouth, N. C.	4.0	Current Meter	U. S. G. S. w. s. p. 49
August 12, 1900	North Fork Elk				
	Creek	At Banners Elk, N. C.	7.0	Current Meter	U. S. G. S. w. s. p. 49
October 8, 1900	North Fork Elk				
	Creek	At Banners Elk, N. C.	4.0	Current Meter	S.
August 12, 1900	Rockhouse Creek	At mouth, N. C.	16.3	Current Meter	TÓ TÓ
October 18, 1900	Rockhouse Creek	At mouth, N. C.	8.0	Current Meter	S. G. S.
July 30, 1900	Roan Creek	Above mouth of Mill Creek, Tenn	60.3	Current Meter	S. G
August 13, 1900	Roan Creek	Key Station, Tenn	5.2	Current Meter	S. G. S.
August 3, 1900	Shell Creek	At mouth, Tenn	14.0	Current Meter	G. S.
August 2, 1900	Sinking Creek	Lower ford of Johnson City-Elizabethton road, Tenn.	5.0	Current Meter	S. G. S.
October 4, 1900	Sinking Creek	Lower ford of Johnson City-Elizabethton road, Tenn!	4.0	Current Meter	U. S. G. S. w. s. p. 49

Current Meter U. S. G. S. w. s. p. 49	U. S. G.	U. S. G. S.	U. S. G.	U. S. G. S. w. s. p.	U. S. G. S. W. S. p.	U. S. G. S. w. s. p.	U. S. G. S. w. s. p.	U. S. G. S. w. s. p.	g .n	s .n	02	U.	02	U. S. G. S. w. s. p.	Ó	S. G. S. w. s. p.	1	-	-	-	H.	U.	Current Meter U. S. G. S. w. s. p. 523	Current Meter U. S. G. S. w. s. p. 523	Current Meter U. S. G. S. w. s. p. 49	Floats C. C. Babb	Floats C. C. Babb	Floats C. C. Babb
9.38	8.48	44.0	16.0	48.0	29.3	0.9	450.0	593.0	403.0	348.0	993.0	533.0	673.0	79.0	53.0	0.09	19.0	37.8	37.8	115.0	29.0	1,950.0	1,110	2,330	5.0	0.07	82.0	52.0
At Banners Elk, N. C.	At Banners Elk, N. C.	1/2 mile above mouth, Tenn	1/2 mile above mouth, Tenn	1/2 mile above mouth, Tenn	At Shoun Crossroads, Tenn	At Shoun Crossroads, Tenn	Elizabethton, Tenn.	Elizabethton, Tenn.	Elizabethton, Tenn.	Elizabethton, Tenn.	Elizabethton, Tenn.	Elizabethton, Tenn.	Elizabethton, Tenn.	Watauga Falls, N. C.	Watauga Falls, N. C.	Watauga Falls, N. C.	1 mile above Shull's Mill, N. C.	1/2 mile below Laurel Creek	Laurel Creek	Watauga Falls	Shull's Mill	Elizabethton, Tenn.	Elizabethton, Tenn.	Elizabethton, Tenn.	1 mile above mouth, Tenn.	Mortime Iron Bridge	Below Harper Creek	Mortime Iron Bridge.
South Fork of Elk Creek	Creek	Stony Creek	Stony Creek	Stony Creek	Town Creek	Town Creek	Watauga River	Watauga River	Watauga River	Watauga River	Watauga River	Watauga River	Watauga River	Watauga River	Watauga River	Watauga River	Watauga River	Watauga River	Watauga River	Watauga River	Watauga River	Watauga River	Watauga River	Watauga River	Wilson Creek	Wilson Creek.	Wilson Creek.	Wilson Creek
August 11, 1900 52	October 6, 1900	August 3, 1900	October 5, 1900	December 31, 1900	July 29, 1900	August 13, 1900	July 16, 1900	August 2, 1900	August 16, 1900	October 5, 1900	November 7, 1900	December 28, 1900	December 31, 1900	July 16, 1900	August 10, 1900	October 7, 1500	August 11, 1900	September 20, 1919.	September 21, 1919	September 21, 1919	September 21, 1919	April 2, 1921	April 25, 1921	July 25, 1921	Angust 3, 1900	June 18, 1920	April 13, 1921	April 14, 1921

MISCELLANEOUS DISCHARGE MEASUREMENTS NOLICHUCKY RIVER BASIN

Authority	C C C C C C C C C C C C C C C C C C C
Method of Measuring	Current Meter
Disc. Cu. Ft. Per Sec.	16 25 19 7 10 6 10 6 10 6 10 6 10 6 10 7 10 6 10 7 10 7 10 8 10 8 10 8 10 8 10 8 10 8 10 8 10 8
Location	Near Burnsville, N. C. I mile above mouth, N. C. I mile above mouth, N. C. Flat Rock. Near Spruce Pine, N. C. At mouth, N. C. Ford of Huntdale-Bakersville road, N. C. Ford of Huntdale-Bakersville road, N. C. Ford of Huntdale-Bakersville road, N. C. Ford of Micaville-Marion road, N. C. Namile above mouth, N. C. Bakersville, N. C. Near Big Tom Wilson's, N. C. Huntdale, N. C.
Stream	Bald Creek. Bald Mt. Creek. Bald Mt. Creek. Band Mt. Creek. Bear Creek. Bear Creek. Beaver Creek Big Creek. Big Rook Creek. Bush Creek. Brown Creek. Brown Creek. Cane Branch. Cane Branch. Cane Greek. Cane Greek. Cane Creek. Caney River. Caney River. Caney River. Caney River. Caney River. Caney River.
Date	September 2, 1900 - Cotober 18, 1900 - Cotober 17, 1900 - Cotober 20, 1900 - Cotober 20, 1900 - Cotober 21, 1900 - Cotober 21, 1900 - Cotober 11, 1900 - Cotober 19, 1900 - Cotober 19, 1900 - Cotober 21, 1900 - Cotober 21, 1900 - Cotober 20, 1900 - Cotober 20, 1900 - Cotober 21, 1900 - Cotober 38, 1900 - Cotober 31,

Current Meter U. S. G. S. w. s. p. Current Meter U. S. G. S. w. s. p. Current Meter U. S. G. S. w. s. p. Current Meter U. S. G. S. w. s. p. Current Meter U. S. G. S. w. s. p. Current Meter U. S. G. S. w. s. p. Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. Current Meter U. S. G. S. w. s. Current Meter U. S. G. S. w. s.	Current Meter U. S. G. S. w. s. p. Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p. Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p. Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p.	Current Meter U. S. G. S.	Current Meter	Current Meter U. S. G. S. w. s. p. 63 Current Meter U. S. G. S. w. s. p. 63	Current Meter	S. G. S. W. S. p.	G.S.W.B.D.	U. S. G. S. w. s. p.	5 5	Current Meter U. S. G. S. w. s.
4.69 2.51 7.24 15.2 14.55 1.29	4.78 1.49 6.09	9.15	5.98	9.03	8.71	7.6	2.12	2.61	17.54	3.83	3.78	9.20	105	79	78	570 241	1.65
Near Burnsville. Ford of Micaville-Marion road, N. C. Ford of Micaville-Marion road, N. C. Ford of Burnsville-Spruce Pine road, N. C. Ford of Burnsville-Spruce Pine road, N. C. At mouth, N. C.	Near Big Tom Wilson's, N. C	1 1	Ford of Erwin-Bakersville road, N. CFord of Erwin-Bakersville road, N. C	At mouth, N. C.	At mouth, N. C.	At mouth, N. C.	At mouth, N. C.	At mouth, N. C.	Just above lower ford of Micaville-Spruce Pine road	Just above tower ford of micavine-Spruce 1 me road	At mouth, N. C. Ford of Micaville-Marion road, N. C.	Ford of Micaville-Marion road, N. C	Near Spruce Pine.	Plum Tree, N. C.	Near Spruce Pine.	Near Spruce Pine	At mouth, N. C.
Cattail Creek Colbert Creek Colbert Creek Crabtree Creek Crabtree Creek	Elk Fork Creek Elk Fork Creek	Grassy Creek	Hollow Poplar Creek Hollow Poplar Creek	Horse Creek	Jack Creek	Kentucky Fork of North Toe	Little Bald Mt.	Little Bald Mt.	Little Crabtree Creek	Locust Creek	Locust Creek	Middle Creek	North Toe River.	North Toe River	North Toe River	North Toe River	
October 18, 1900 August 31, 1900 October 26, 1900 August 25, 1900 October 20, 1900	September 1, 1900 October 18, 1900	October 20, 1900 August 27, 1900	August 23, 1900 October 16, 1900	August 28, 1900 October 24, 1900	September 3, 1900 November 19, 1900	August 27, 1900	September 2, 1900	October 17, 1900	August 30, 1900	August 30, 1900	October 26, 1900	October 26, 1900.	July 2, 1900	August 27, 1900	August 27, 1900 October 21, 1900	October 25, 1900 November 10, 1920	September 3, 1900

MISCELLANEOUS DISCHARGE MEASUREMENTS NOLICHUCKY RIVER BASIN—Continued

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Date	Stream	Location	Disc. Cu. Ft. Per Sec.	Method of Measuring	Authority
October 19 1900	Pineon Creek	**************************************	1 98	Current Motor	× × × × × × × × × × × × × × × × × × ×
1 10 1000	Tigeon Cleek		07.1	Current meter	
October 19, 1900	Pigeon Roost Creek.	At mouth, N. C.	4.12	Current Meter	w. s. p.
August 24, 1900	Pigeon Roost Creek. At mouth, N. C	At mouth, N. C.	14.5	Current Meter	U. S. G. S. w. s. p. 63
August 27, 1900	Plumtree Creek	Plumtree, N. C.	8.09	Current Meter	S. G. S. w. s. p.
September 2, 1900	Price Creek	Near Burnsville, N. C.	9.46	Current Meter	U. S. G. S. w. s. p. 63
October 18, 1900	Price Creek	Near Burnsville, N. C.	8.35	Current Meter.	S. G. S. w. s. p.
August 27, 1900	Roaring Creek	At mouth, N. C.	15.57	Current Meter	
August 31, 1900	Rock Creek	Ford of Micaville-Marion road, N. C.	6.92	Current Meter	U. S. G. S. w. s. p. 63
October 26, 1900	Rock Creek	Ford of Micaville-Marion road, N. C.	28.68	Current Meter	U. S. G. S. w. s. p. 63
August 31, 1900	South Toe River	1 mile above mouth of Three Fork Creek, N. C	26.0	Current Meter	S. G. S. w. s. p.
October 26, 1900	South Toe River	1 mile above mouth of Three Fork Creek, N. C	101.0	Current Meter	U. S. G. S. w. s. p. 63
July 1, 1900	South Toe River	Ford of Micaville-Spruce Pine road, N. C	220.8	Current Meter	S. G. S. w. s. p.
August 25, 1900	South Toe River	Ford of Micaville-Spruce Pine road, N. C	8.62	Current Meter	S. G. S. w. s. p.
, August 30, 1900	South Toe River	Ford of Micaville-Spruce Pine road, N. C	86.23	Current Meter	S. G. S. w. s. p.
October 27, 1900	South Toe River	Ford of Micaville-Spruce Pine road, N. C	282.9	Current Meter	S. G. S. w. s. p.
August 25, 1900	Snow Creek	Wing, N. C.	2.0	Current Meter	တ်
August 27, 1900	Squirrel Creek	1/4 mile above mouth	11.2	Current Meter	S. w. s. p.
August 31, 1900	Three Fork Creek	14 mile above mouth	67.6	Current Meter.	S. G. S. w. s. p.
August 26, 1900	Threemile Creek	Near Old Post Office at Elsie, N. C	2.63	Current Meter	S. G
October 21, 1900	Threemile Creek	Near Old Post Office at Elsie, N. C	3.57	Current Meter	U. S. G. S. w. s. p. 63
August 24, 1900	Toe River	Huntdale, N. C.	381	Current Meter.	S. G. S. w. s. p.
October 17, 1900	Toe River	Near Huntdale, N. C.	301	Current Meter.	U. S. G. S. w. s. p. 63
August 27, 1900	Whiteoak Creek	At mouth, N. C.	3.36	Current Meter	
August 30, 1900	Whiteoak Creek	At mouth, N. C.	4.40	Current Meter	U. S. G. S. w. s. p. 63
October 26, 1900	Whiteoak Creek	At mouth, N. C.	19.86	Current Meter	U. S. G. S. w. s. p. 63

MISCELLANEOUS DISCHARGE MEASUREMENTS FRENCH BROAD RIVER BASIN

Current Meter	Current Meter
11.31 14.0 8.0 6.8 6.8 6.3 6.3 1.46 1.169 41.72 49.0 55.0 4.85 60.0 30.2 15.17 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	46.0 22.83 5.33 5.0 938 840 266 113
Bridge on road from Mills River to Asheville— Davidsons River, N. C. Savids above mouth. Maile below mouth of Bull Creek. Maile below mouth. Ditter above mouth. Near mouth. Ford of Brevard-Jeptha road. Near mouth.	Near mouth. 2 miles below Black Mountain Station. 4 th mouth. 34 mile above Hot Springs. Mexander, N. C. Near Carson Creek. Bastatoe Bridge, N. C. Penrose, N. C.
H D D C C B B B B B B B B B B B B B B B B	Broad River————————————————————————————————————
September 18, 1920 May 19, 1904 July 19, 1904 August 17, 1904 December 8, 1904 April 13, 1905 Nov. 14, 1905 Nov. 14, 1905 September 12, 1900 September 17, 1900 September 18, 1900 September 17, 1900 September 17, 1900 September 17, 1900	September 20, 1900 September 11, 1900 October 29, 1900 September 7, 1900 September 12, 1900 September 14, 1900 September 17, 1900

MISCELLANEOUS DISCHARGE MEASUREMENTS FRENCH BROAD RIVER BASIN—Continued

	Mis	Miscellaneous Discharge Measurements French Broad Kiver Basin-Continued	D KIVER BA	SIN—Continued	
Date	Stream	Location	Disc. Cu. Ft. Per Sec.	Method of Measuring	Authority
Sentember 18, 1900	Franch Broad	Fanning Bridge, N. C.	1.161	Current Meter.	U. S. G. S. w. s. p. 63
October 15, 1900	French Broad	Eastatoe Bridge, N. C.	102	Current Meter	U. S. G. S. w. s. p. 63
October 15, 1900	French Broad	Near Carson Creek	206	Current Meter	U. S. G. S. w. s. p. 63
October 29, 1900	French Broad	Alexander	2,068	Current Meter	U. S. G. S. w. s. p. 63
October 27, 1900	French Broad	Fanning Bridge, N. C.	614	Current Meter.	U. S. G. S. w. s. p. 63
May 20, 1904	French Broad	Alexander, N. C.	1,329	Current Meter	U. S. G. S. w. s. p. 128
August 23, 1919	French Broad	Alexander, N. C.	862	Current Meter	U. S. G. S. w. s. p. 503
November 5, 1920	French Broad	Marshall, N. C.	1,210	Current Meter	U. S. G. S. w. s. p. 523
September 19, 1900.	Hominy Creek	Asheville	0.08	Current Meter	U. S. G. S. w. s. p. 63
October 17, 1900	Hominy Creek	Asheville	24.0	Current Meter	U. S. G. S. w. s. p. 63
September 17, 1900.	King Creek	Brevard road	15.46	Current Meter	U. S. G. S. w. s. p. 63
September 16, 1900	Lees Creek	Olivette	3.95	Current Meter	U. S. G. S. w. s. p. 63
October 30, 1900	Lees Creek	Olivette	2.29	Current Meter	U. S. G. S. w. s. p. 63
September 17, 1900.	Little River Creek	34 mile above mouth	182.8	Current Meter	U. S. G. S. w. s. p. 63
October 16, 1900	Little River Creek	% mile above mouth	69.2	Current Meter	U. S. G. S. w. s. p. 63
September 8, 1900	Little Pine Creek	100 yards above mouth	3.33	Current Meter	U. S. G. S. w. s. p. 63
October 31, 1900	Little Pine Creek	100 yards above mouth	0.9	Current Meter	U. S. G. S. w. s. p. 63
September 14, 1900	Middle Fork of				
	French Broad	Bridge 20 yards above ford	0.77	Current Meter	S. G. S. w. s. p.
September 17, 1900.	Mills River	Bridge on Old Haywood road	211.64	Current Meter	S. G. S. w. s. p.
October 17, 1900	Mills River	Bridge on Old Haywood road	94.0	Current Meter	S. G. S. w. s. p.
September 18, 1900.	Mud Creek	Near mouth	108.0	Current Meter	S. G. S. w. s. p.
September 12, 1900.	Newfound Creek	At mouth	9.41	Current Meter	S. G. S. w. s. p.
September 16, 1900	Newfound Creek	% mile above mouth	34.16	Current Meter	U. S. G. S. w. s. p. 63
October 30, 1900	Newfound Creek	% mile above mouth	20.23	Current Meter.	S. G. S. w. s. p.
September 14, 1900	North Fork of				
	French Broad	200 yards above mouth of West Fork	9.001	Current Meter	U. S. G. S. w. s. p. 63
October 15, 1900	North Fork of				
	French Broad	200 yards above mouth of West Fork	51.8	51.8 Current Meter	U. S. G. S. w. s. p. 63

Current Meter U. S. G. S. w. s. p. 6	S. H. Wright	WeirS. H. Wright	Current Meter U. S. G. S. w. s. p. 63 Current Meter U. S. G. S. w. s. p. 63	00 00	U. S. G. S. w. s. p.	OD 0.	U. S. G. S. w. s. p.		Current Meter U. S. G. S. W. s. p. 63	U. S. G. S. w. s. p.	U. S. G. S. w. s. p.	U. S. G. S. w. s. p.	U. S. G. S. w. s. p.	U. S. G. S. w. s. p.	U. S. G. S. w. s. p.	Current Meter U. S. G. S. w. s. p. 63		Current Meter U. S. G. S. w. s. p. 63
107.48		501	21.45	9.0		55.23			15.0	_	_	_	_		_	2.24 (149.0
Bridge on Brevard-Webster road	Ford on road between 1 denet and broad dreeks	Hendersonville Intake Dam	3 miles above Swannanoa	At mouth	Bailey	Bailey	Near Hot Springs.		Footbridge at ford of main road	Near Hot Springs	Biltmore	200 yards above mouth	Blackwell Springs	Blackwell Springs	At mouth	At mouth		Near mouth
North Fork of French Broad	North Fork Mills River	North Fork Mills River	nanoa River	Reems Creek	Sandymush Creek	Sandymush Creek.	Shutin Creek	So. Fork of French	Broad River.	Spring Creek	Swannanoa River	Tucker Creek	Turkey Creek	Turkey Creek	Walnut Creek	Walnut Creek	West Fork of French	Broad River
September 16, 1900 North Fork of French Broad September 16, 1900 North Fork of	October, 1922	May, 1923		September 12, 1900.	September 12, 1900	September 17, 1900	September 7, 1900	September 14, 1900	Sentember 7 1000	November 1, 1900	September 19, 1900	September 16, 1900	September 16, 1900.	October 30, 1900	September 10, 1900.	October 31, 1900	September 14, 1900	

MISCELLANEOUS DISCHARGE MEASUREMENTS LITTLE TENNESSEE RIVER BASIN

	Authority	U. S. G. S. w. s. p. 243 U. S. G. S. w. s. p. 243 U. S. G. S. w. s. p. 243		U. S. G. S. w. s. p. 243		U. S. G. S. w. s. p. 243 U. S. G. S. w. s. p. 243		U. S. G. S. W. S. p. 49 U. S. G. S. W. S. p. 63 U. S. G. S. W. S. p. 49 U. S. G. S. W. S. p. 63 U. S. G. S. W. S. p. 63
IVER DASIN	Method of Measuring	Current Meter	R Basin	Current Meter	Basin	Current Meter	Basin	Current Meter
ENNESSEE L	Disc. Cu. Ft. Per Sec.	96 29 36	SEGEE RIVE	45	OAH RIVER	109	SSEE RIVER	18.8 40.0 96.0 20.6 86.0 94.4 149.0
MISCELLANEOUS DISCHARGE MEASUREMENTS LITTLE LENNESSEE MIVER DASIN	Location	Cherokee, N. C. Cherokee, N. C	MISCELLANEOUS DISCHARGE MEASUREMENTS TUCKASEGEE RIVER BASIN	At mouth near Dillsboro	MISCELLANEOUS DISCHARGE MEASUREMENTS CHEGAR RIVER BASIN	Millsaps, N. C	Miscellaneous Discharge Measurements Hiwassee River Basin	Caldwell, Ga. At Choestoe road. 334 miles southeast of Blairsville, Ga. Hivase, Ga. Near mouth. Brasstown, Ga. At bridge near mouth.
	Stream	Soco Creek. Soco Creek. Soco Creek.		Savannah Creek		Snowbird Creek		Arququah Creek Arququah Creek Bell Creek Big Creek Brasstown Creek Brasstown Creek Brasstown Creek
	Date	April 20, 1907 August 27, 1907 October 19, 1907		August 26, 1907		August 24, 1907 October 16, 1907		July 27, 1900 January 15, 1901 August 2, 1900 January 10, 1901 August 1, 1900 January 18, 1901 May 13, 1904

Current Meter	Current Meter U. S. G Current Meter U. S. G Current Meter U. S. G
104 29.3 32.0 13.7 28.9 6.8 6.8 99.6 75.0 20.2 20.2 20.2 20.2 20.2 20.2 20.2 2	15.0 75.0 33.9
Brisstown, N. C. Blairsville, Ga. Just below bridge at mouth Camp Creek, Ga. Mountain Seene, Ga. 154 miles southeast Choestoe, Ga. 225 miles southeast Blairsville, Ga. 227 miles southeast Blairsville, Ga. 228 miles north of Mountain Scene, Ga. Mecca, Tenn Coosa Creek, Ga. Bridge about 2½ miles from mouth. Near fork between Gaddistown and Blairsville, Ga. Near fork between Gaddistown and Blairsville, Ga. Near feliance, Tenn. 8 miles from mouth. Near wouth. Near mouth. Near Murphy. Near Murp	172 mines northwest of francisco, da. Hiwassee, Ga. About 2 miles above mouth ¼ mile above mouth.
Brasstown Creek Butternut Creek Camp Creek Camp Creek Childers Creek Choestee Creek Chostee Creek Chostee Creek Chostee Creek Chostee Creek Consasuga Creek Consasuga Creek Consasuga Creek Coosa Creek Coosa Creek Coopa Creek Fightingtown Creek Fightingtown Creek Fightingtown Creek Fightingtown Creek Fightingtown Creek Fightingtown Creek High Shoals Creek Hanging Dog Creek High Shoals Creek Hiwassee River Hiwassee River Hiwassee River	Hog Creek
August 22, 1907	August 2, 1901 August 2, 1900 January 24, 1901 January 16, 1901

MISCELLANEOUS DISCHARGE MEASUREMENTS HIWASSEE RIVER BASIN-Continued

	Date	Stream	Location	Disc. Cu. Ft. Per Sec.	Method of Measuring	Authority
4	Tuly 30, 1900	Ivy Log Creek	Ivy Log, Ga.	32.7	Current Meter	U. S. G. S. w. s. p. 49
	July 27, 1900	Level Land Creek	Choestoe, Ga.	29.5	Current Meter	U. S. G. S. w. s. p. 49
	August 2, 1900	Long Bullet Creek	Twine, N. C.	11.9	Current Meter	G. S.
	August 26, 1901	Long Bullet Creek	3 miles northwest of Hiwassee, Ga	26.0	Current Meter	G. S. w. s. p.
	August 17, 1900	Lost Creek	Near Reliance, Tenn	7.7	Current Meter	S. G. S. w. s. p.
	September 4, 1900	Lost Creek	Near Reliance, Tenn	6.5	Current Meter	S. G. S. w. s. p.
	December 5, 1903	Martin Creek	Near Murphy	4.0	Current Meter	G. S. w. s. p.
	January 12, 1901	Mill Creek	At mouth	122.0	Current Meter	S. G. S. w. s. p.
	August 3, 1900	Mill Creek	Hiwassee, Ga	22.3	Current Meter	S.G.
	August 23, 1901	Miller Creek	14 mile northeast of Blairsville, Ga	0.78	Current Meter.	Ġ
21	July 31, 1900	Mocassin Creek	Ivy Log, Ga	12.8	Current Meter.	S. G.
	August 20, 1901	Mulky Creek	Near fork between Gaddistown and Blairsville, Ga	75.0	Current Meter	G. S. w. s. p.
	August 20, 1901	Nickle Creek	14 mile south of Gaddistown, Ga	12.8	Current Meter.	S. G. S. w. s. p.
	January 11, 1901	Noontootly Creek	At foot log 1/2 mile from mouth	207.0	Current Meter	G.
	July 31, 1900	Nottely River	Thompson's bridge, Ga	462.0	Current Meter	S. G.
	January 14, 1901	Nottely River	Bridge 11/2 miles from Blairsville, Ga	450.0	Current Meter	S. G. S. w. s. p.
	January 15, 1901	Nottely River	At foot log just above mouth of Stink Creek	131.0	Current Meter	S. G. S. w. s. p.
	January 17, 1901	Nottely River	At Thompson's bridge, Ivy Log, Ga	616.0	Current Meter	Ġ
	August 20, 1901	Nottely River	1 mile southwest of Blairsville, Ga	955.0	Current Meter	G. S. w. s. p.
.7	July 26, 1900	Nottely River	Choestoe, Ga.	46.8	Current Meter	U. S. G. S. w. s. p. 49
	July 28, 1900	Nottely River	Blairsville, Ga.	505.1	Current Meter	G. S. w. s. p.
	January 26, 1901	Okoee River	Parksville, Tenn.	1,602.0	Current Meter	G. S. w. s. p.
	August 3, 1900	Owl Creek	Hiwassee, Ga	12.3	Current Meter	S. G. S. w. s. p.
	August 27, 1901	Owl Creek	1 mile north of Mountain Scene, Ga	87.1	Current Meter	S. G. S. w. s. p.
	July 31, 1900	Rapier Creek	Ranger, N. C.	22.0	Current Meter	S.G.
	January 12, 1901	Rock Creek	Near mouth	132.0	Current Meter	S. G. S. w. s. p.
	August 3, 1900	Scata way Creek	Visage, Ga.	3.2	Current Meter	S. G. S. w. s. p.
	January 11, 1901	Skeenah Creek	1 mile above mouth	109.0	Current Meter	U. S. G. S. w. s. p. 63
	August 17, 1900	Spring Creek.	At mouth, Tenn.	6.8	Current Meter	œ
	September 4, 1900 1	Spring Creek	At mouth, Tenn	4.3	Current Meter.	U. S. G. S. w. s. p. 49

u. s.	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter. U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 49	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 49	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 63	Current Meter. U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 49	Current Meter U. S. G. S. w. s. p. 63	Current Meter U. S. G. S. w. s. p. 49	Current Meter U. S. G. S. w. s. p. 63	
4.0	0.64	48.0	167.0	22.8	64.0	144.0	2,475.0	396.0	43.0	175.0	67.4	147.6	55.6	85.0	0.76	22.8	20.0	55.0	81.3	94.0	
Springtown, Tenn.	1 mile above mouth	1 mile above mouth	Near Choestoe, Ga.	Caldwell, Ga.	Near mouth	1 mile northeast of Gaddistown, Ga	At Van Sant's Bridge	11/2 miles above mouth Copper Creek	Just above mouth of Mill Creek	Just below Suches Creek	114 miles south of Gaddistown, Ga	1 mile southeast of Gaddistown, Ga	Caldwell, Ga.	14 mile from mouth	2 miles from mouth	1/2 mile south of Gaddistown, Ga	Caldwell, Ga.	On south side of Nottely River	Near mouth, Ga	1 mile above mouth	
Spring Creek	Stanley Creek	Stink Creek.	Stink Creek	Stink Creek.	Suches Créek	Suches Creek	Toccoa River	Town Creek	Town Creek	Weaver Creek	Williams Creek	Wolf Creek	Wolf Creek	Young Cone Creek	Young Cone Creek						
August 18, 1900,	January 10, 1901	January 15, 1901	August 21, 1901	July 27, 1900	January 14, 1901	August 20, 1901	January 11, 1901	January 12, 1901	January 12, 1901	January 14, 1901	September 19, 1901	August 20, 1901	July 27, 1900	January 15, 1901	August 22, 1901	August 20, 1901	July 27, 1900	January 15, 1901	July 30, 1900	January 16, 1901	

Measurements of Stream Flow in 1925 Drought, Made by U. S. Geological Survey Note. *Shows measurements made at regular gaging stations of U. S. Geological Survey. TABLE 5

Drainage Area Sq. Mi.										256		531	531	531		87	87	46	46	46	155	459	459	41	343	33	33	33	109
Discharge Sec. Ft.		27.3	92.	1.60	1,360	46.6	228	4.66	89.6	185	130	119	226	279	9.45	33.8	21.1	39.0	32.9	12.7	51.1	146	202	22.0	10.4	5.91	3.97	9.03	21.1
Location		Mt. Airy, N. C.	Above Beaver Lake at Asheville, N. C.	Concord, N. C.	Boiling Springs, N. C.	Lake Lure dam at Chimney Rock, N. C	Boiling Springs, N. C.	Near Burnsville, N. C.	Route 29 crossing at Fletcher, N. C.	Tallulah Falls, Ga.	Near Cary, S. C.	Carters, Ga.	Carters, Ga.	Carters, Ga.	Near Spruce Pine, N. C.	Cullasaja, N. C.	Cullasa ja, N. C.	Asbury, N. C.	Asbury, N. C.	Asbury, N. C.	Francisco, N. C.	Pine Hall, N. C.	Pine Hall, N. C.	Brevard, N. C.	Ramseur, N. C.	High Point, N. C.	High Point, N. C.	High Point, N. C.	Dobson, N. C.
Stream		Ararat River	Beaverdam Creek	Big Cold Creek	Broad River	Broad River	Broad River	Cane Creek	Cane Creek	Chattooga River	Congaree Creek	Coosawattee River	Coosawattee River	Coosawattee River.	Crabtree Creek	Cullasagee River	Cullasagee River	Dan River	Dan River	Dan River	Dan River	Dan River	Dan River	Davidson River	Deep River	Deep River West Branch	Deep River West Branch	Deep River West Branch	Fisher River
Date	1995	August 19	August 25	October 5	*August 5	August 5	*September 10	August 14	August 25	August 8	August 31	August 14	August 15	August 15	August 14	*August 7	*September 9	*August 19	*August 20	*August 20	*August 20	*August 20	*August 20	*September 30	*October 7.	*August 20	*October 6	*October 30	*August 19

Fork
North Fork. In the state of the state of the state. See River. See River. See River.

Table 5—Continued

Date	Stream	$\mathbf{Loeation}$	Discharge Sec. Ft.	Drainage Area Sq. Mi.
*Sentember 9	Nantahala River	A Imond. N. C.	80.7	177
*Annil 22	New Biver North Fork	Warrensville N C	113	0 30
* 1.15. 6	New River North Fork	Warmanarilla N C	0 90	90.90
*Anoust 16	New River, North Fork	Warrensville, N. C.	44.5	9. 20
August 18	New River, North Fork	Crumpler, N. C.	7 26	279
*April 23	New River, South Fork	Near Jefferson, N. C.	243	208
*July 6	New River, South Fork	Near Jefferson, N. C.	144	208
August 15	New River, South Fork	Near Boone, N. C.	7.30	
*August 16	New River, South Fork	Near Jefferson, N. C.	112	208
*August 17	New River, South Fork	Fleetwood, N. C.	48.6	
August 18	New River, South Fork	Near Crumpler, N. C.	132	325
August 18	New River, South Fork	Near Crumpler, N. C.	129	325
*August 18	New River, South Fork	Near Jefferson, N. C.	87.9	142
*August 5	Nottely River	Ranger, N. C.	97.3	272
*September 10	Nottely River.	Ranger, N. C.	57.8	272
*August 3	Oconalufty River	Cherokee, N. C.	88.88	133
*September 8	Oconalufty River	Cherokee, N. C.	64.0	133
*September 10	Pacolet River, North	Tryon, N. C.	12.8	49
*September 11	Pigeon, Rivert	Mt. Sterling, N. C.	398	
*September 21	Pigeon Rivert	Mt. Sterling, N. C.	63.1	
*September 23	Pigeon River†	Crabtree, N. C.	47.2	244
September 22	Pigeon River, East Fork	1 mile above mouth of Crawford Creek	8.31	
September 22	Pigeon River, East Fork	1 mile above mouth of Crawford Creek	8.35	
September 22	Pigeon River, East Fork	1500 feet downstream from mouth Hungry Creek.	13.1	
September 11	Pigeon River, West Fork	Spruce, N. C.	11.0	
September 21	Pigeon River, West Fork	Spruce, N. C.	10.8	
August 29	Raccoon Creek	Near Waynesville, N. C.	2.14	
August 22	Reedy Fork	Near Summerfield, N. C.	90.7	
August 19	Reddies River	Near North Wilkesboro, N. C.	35.7	93
August 31	Reems Creek	Near Weaversville, N. C.	11.71	
*October 10	Roanoke River	Old Gaston, N. C.	1,820	8,350

14.800	41.4	41.4 69 130 130	200 673 200 673	23 29 66 500 3,400 3,400
309 179 198 1.37 17.4	3,120 508 6.57 15.0 2.61	2.55 19.9 41.1 46.2 16.8	362 .8 63.9 38.7 383 383	23.9 8.93 24.7 230 178 990 1,290
Near Roaring River, N. C. Near Columbia, S. C. Columbia, S. C. Lexington Power Co., dam site, Lexington, S. C. Banning Springs, N. C.	St. Stephens, S. C. Cliffside, N. C. Burch, N. C. Near Cherokee, N. C. Charlotte, N. C.	Charlotte, N. C. Statesville, N. C. Above mouth Beaver Creek at Spruce Pine. Spruce Pine, N. C. Near Micaville, N. C. Walnut Cove, N. C.	East LaPort, N. C. Bryson, N. C. East LaPort, N. C. Bryson, N. C. Hartwell, Ga. Hartwell, Ga.	Tomotia, N. C. Tomotia, N. C. Above Valle Crucis, N. C. Adako, N. C. North Wilkesboro, N. C. Salisbury, N. C. High Rock, N. C. Salisbury, N. C.
Roaring River Saluda River Saluda River Saluda River Saluda River Sandy River	santee niver. Santee River. Second Broad Snow Creek. Sucar Creek	Sugar Creek Third Creek Toe River, North Toe River, North Toe River, South Town Fork Creek	Tuckasegee River. Tuckasegee River. Tuckasegee River. Tuckasegee River. Tugalo River. Tugalo River.	Valley Kiver. Valley River. Wilson Creek. Yadkin River. Yadkin River. Yadkin River. Yadkin River. Yadkin River. Yadkin River.
August 19 August 31 September 8 September 10	September 2 September 2 August 5 August 19 September 8 September 9	*September 9 August 22 August 14 *August 14 August 14 August 14 August 14	*August 3 *August 4 *September 7 *September 8 August 10	*August 6. *Septemger 10. *August 15. *August 18. *August 18. *August 19. *August 22. *October 5.

Nore. †=Measurements made by engineers of Phoenix Utility Co.

Table 6 Convenient Equivalents

The following is a list of convenient equivalents for use in hydraulic computations:—

Table for converting velocity in feet per second into velocity in miles per hour

1 foot per second = 0.631818 mile per hour, or very nearly \(\frac{2}{3} \) mile per hour. 1 mile per hour = 1.4666 feet

per second, or very nearly 1½ feet per second. In computing the
table the values 0.68182 and 1.4667 were used.

Units					Ter	nths				
Clifts	0	1	2	3	4	5	6	7	8	9
3										
)	0.000	0.068	0.136	0.205	0.273	0.341	0.409	0.477	0.545	0.61
	0.682	0.750	0.818	0.886	0.955	1.020	1.090	1.160	1.230	1.30
2	1.360	1.430	1.500	1.570	1.640	1.700	1.770	1.840	1.910	1.9
	2.050	2.110	2.180	2.250	2.320	2.390	2.450	2.520	2.590	2.6
	2.730	2.800	2.860	2.930	3.000	3.070	3.140	3.200	3.270	3.3
	3.410	3.480	3.550	3.610	3.680	3.750	3.820	3.890	3.950	4.0
	4.090	4.160	4.230	4.300	4.360	4.430	4.500	4.570	4.640	4.7
,	4.770	4.840	4.910	4.980	5.050	5.110	5.180	5.250	5.320	5.3
	5.450	5.520	5.590	5.660	5.730	5.800	5.860	5.930	6.000	6.0
		6.200	6.270	6.340	6.410	6.480	6.550	6.610	6.680	6.7
	6.140	0.200	0.270	0.540	0.410	0.480	0.550	0.010	0.000	0.7

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area*

		Run-of	f Depth in	n Inches	
Discharge in Second-feet Per Square Mile	1 day	28 days	29 days	30 days	31 days
1	0.03719	1.041	1.079	1.116	1.153
	0.07438	2.083	2.157	2.231	2.306
	0.11157	3.124	3.236	3.347	3.459
	0.14876	4.465	4.314	4.463	4.612
	0.18595	5.207	5.393	5.578	5.764
	0.22314	6.248	6.471	6.694	6.917
	0.26033	7.289	7.550	7.810	8.070
89	0.29752	8.331	8.628	8.926	9.223
	0.33471	9.372	9.707	10.041	10.376

Table for converting discharge in second-feet into run-off in acre-feet*

Discharge in Second-feet	Run-off in Acre-feet				
	1 day	28 days	29 days	30 days	31 days
	1.983	55.54	57.52	59.50	61.4
	3.967	111.10	115.00	119.00	123.
	5.950	166.60	172.60	178.50	184.
	7.934	222.10	230.10	238.00	246.
	9.917	277.70	287.60	297.50	307.
	11.900	333.20	345.10	357.00	368.
	13.880	388.80	402.60	416.50	430.
	15.870	444.30	460.20	476.00	491.
	17.850	499.80	517.70	535.50	553.

Table for converting discharge in second-feet into run-off in millions of gallons*

Discharge in Second-feet	Run-off in Millions of Gallons				
	1 day	28 days	29 day:	30 days	31 days
	.6463	18.10	18.74	19.39	20.04
	1.2926	36.19	37.49	38.78	40.0
	1.9389	54.29	56.23	58.17	60.13
	2.5852	72.39	74.97	77.56	80.1
	3.2315	90.48	93.71	96.95	100.18
	3.8778	108.58	112.46	116.33	120.2
	4.5241	126.67	131.20	135.72	140.2
	5.1704	144.77	149.94	155.11	160.2
	5,8167	162.87	168.68	174.50	180.3

Table for converting discharge in second-feet into run-off in millions of cubic feet*

Discharge in Second-feet	Run-off in Millions of Cubic Feet				
	1 day	28 days	29 days	30 days	31 days
1	0.0864	2.419	2.506	2.592	2.678
2	0.1728	4.838	5.012	5.184	5.356
3	0.2592	7.257	7.518	7.776	8.034
4	0.3456	9.676	10.024	10.368	10.712
5	0.4320	12.095	12.530	12.960	13.390
6	0.5184	14.514	15.036	15.552	16.068
7	0.6048	16.933	17.542	18.144	18.746
8	0.6912	19.352	20.048	20.736	21.424
9	0.7776	21.771	22.554	23.328	24.107

^{*}Note. For part of a month multiply value for one day by the number of days.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot for one year covers 1 square mile 1.131 feet deep, or 13.572 inches deep.

1 second-foot for one year equals 0.000214 cubic mile; equals 31,536,000 cubic feet. 1 second-foot equals about 1 acre-inch per hour; equals about 2 acre-feet per 24 hours.

1 second-foot falling 10 feet equals 1.136 horse-power.

100 United States gallons per minute equals 0.223 second-foot.

100 United States gallons per minute for one day equals 0.44 acre-feet.

1 million United States gallons per day equals 1.55 second-feet.

I million United States gallons equals 3.07 acre-feet. 1 million cubic feet equals 22.95 acre-feet.

1 acre-foot equals 325,850 gallons; equals 43,560 cubic feet.

1 inch deep on 1 square mile equals 2,323,200 cubic feet.

1 inch deep on 1 square mile equals 0.0737 second-foot per year.

1 acre equals 43,560 square feet. 1 acre equals 209 feet square, nearly.

1 cubic foot equals 7.48 gallons.

1 cubic foot of water weights 62.4 pounds.

1 cubic mile equals 147,198,000,000 cubic feet.
1 cubic mile equals 4,667 second-feet for one year.
1 gallon equals 231 cubic inches (liquid measure).

1 kilometer equals 3,281 feet; equals five-eighths mile, nearly.

1 foot per second equals 0.68 mile per hour. 1 atmosphere equals 14.7 pounds per square inch; 1 ton per square foot; 1 kilogram per square centimeter.

Acceleration of gravity equals 32.16 feet per second every second.

1 horse-power equals 550 foot-pounds per second.

1 horse-power equals 746 watts; equals 0.746 kilowatt.

1 horse-power equals 1 second-foot falling 8.8 feet.

11/3 horse-power equals about 1 kilowatt.

Publications and Investigations of the Water Resources Division

PUBLICATIONS

- Circular 2. The Power Situation in North Carolina, 1921. Out of print.
- Circular 6. The Power Situation in North Carolina, 1922. Out of print.
- 3. Circular 10. The Power Situation in North Carolina, 1919-1923.
- 4. Economic Paper 53. Water-powers of Surry and Wilkes counties.
- 5. Economic Paper 54. Water-power Investigation of Deep River.
- 6. The Power Situation in North Carolina, 1924.

N. C. REPORTS NOW BEING COMPLETED

Water-power Investigation of Cherokee and Clay counties.
Water-power Investigation of Dan River in Stokes County.
Floods on the Cape Fear River System.
Rainfall in North Carolina.

INVESTIGATIONS NOW IN PROGRESS

Water-power Survey of New River, and Watauga River. Evaporation Studies on Piedmont Reservoirs. Floods on North Carolina Streams. Periodicity of Rainfall in North Carolina.

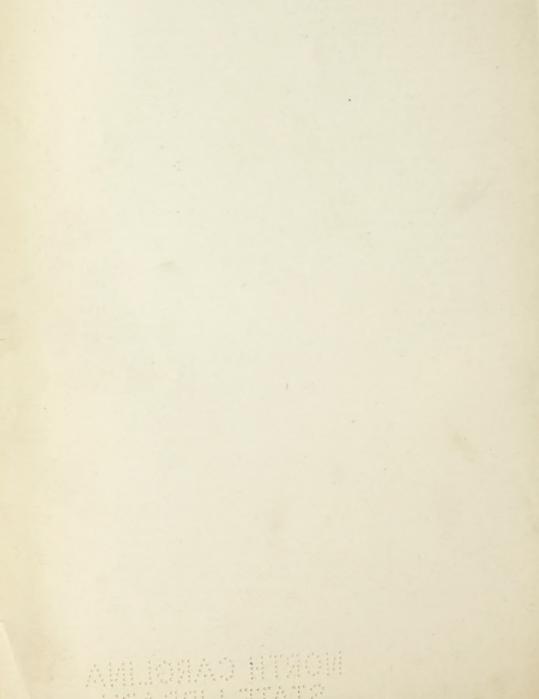
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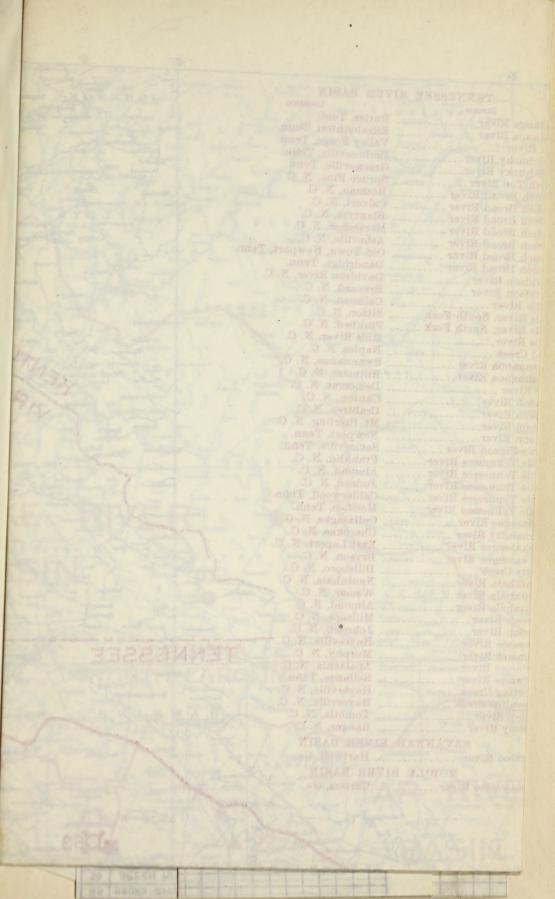
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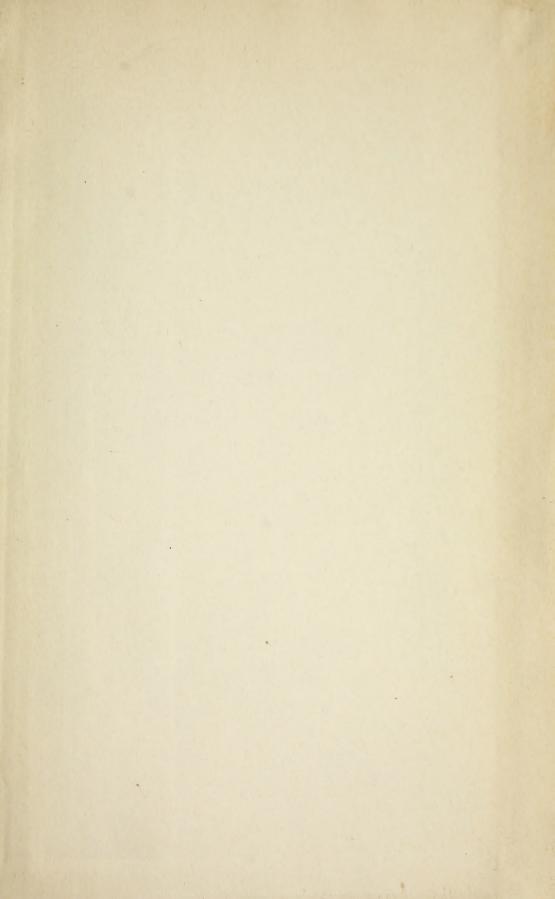
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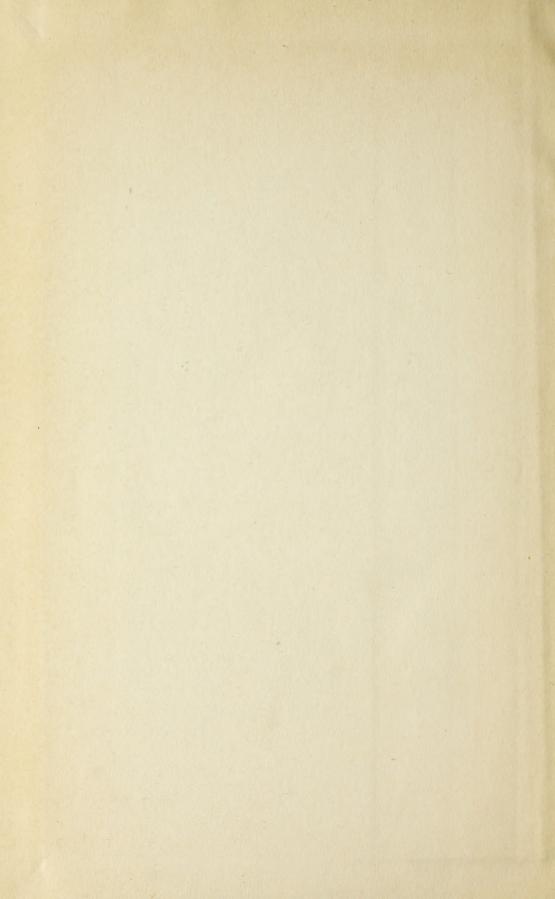
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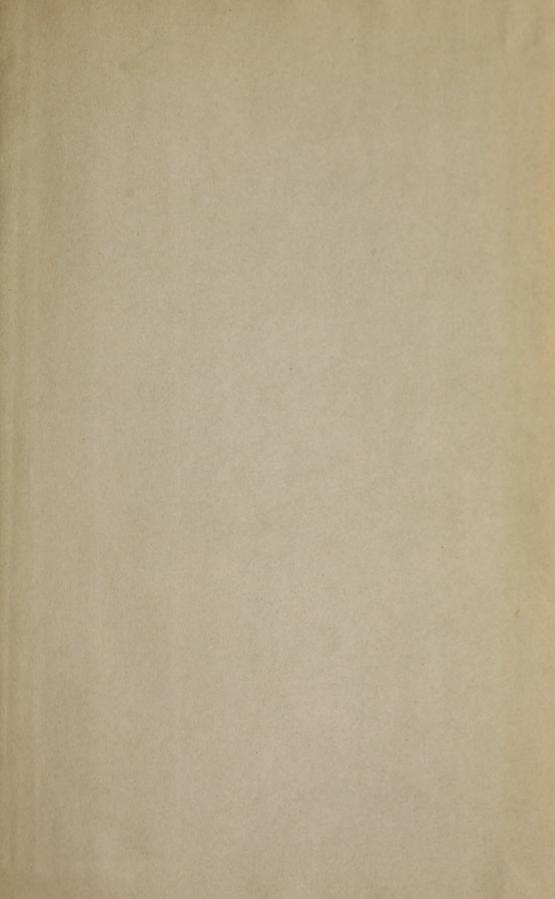
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